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VETERINARY MEDICINE

DECEMBER

NOV 19 1942

Forestry

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VOL. XXXVII
No. 12

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

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VOL. XXXVII DECEMBER, 1942 No. 12

Published Monthly by the
VETERINARY MAGAZINE CORPORATION
7632 S. CRANDON AVE., CHICAGO, ILL., U. S. A.

$4.00 a year; per copy 50 cents; Special Issues $1.00

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Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879. Entered as second-class matter under the title of American Journal of Veterinary Medicine July 19, 1910, at Chicago, Ill., under the Act of March 3, 1879.

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Communicable Disease Problems of the Veterinarian in Wartime

Introduction

The President's statement, that American troops will be sent anywhere in the world where the enemy is to be met, places an obligation on veterinary Army officers to review and familiarize themselves with animal disease conditions all over the world.[1] Such information should include not only indigenous diseases of the soliped in all of the continents and most of the nations but also the prevalent diseases of food-producing animals of those areas, since on occasion it may be necessary to purchase locally food products of animal origin, to supplement the ration of the troops.

Veterinary vital statistics are incomplete in many nations involved in the present war and non-existent in still more of them. Perhaps there is no better way of determining what diseases and parasitisms of military importance may be encountered by a military expedition in various lands, than by a review of the experience of our own and the British veterinary service in the first World War, supplemented by recent veterinary literature. The discussions herein were prepared in this manner. Not all the diseases enzootic in any area are listed but it is believed the list includes the majority of those in each continent which are likely to prove of major importance to an American military expedition. The more important animal diseases indigenous to this country, for which control measures differ materially in the army from the usual practice among the civilian population, are included also.

That the problem of handling exotic diseases will be very real in expeditionary forces is indicated by the fact that animal plagues unknown in this country are rife in the islands of the Western Pacific. Rinderpest, foot-and-mouth disease and anthrax are prevalent in China, and every known infectious disease of domestic animals, except some African trypanosomiases and possibly hog-cholera, is indigenous to the Middle East. Native diseases not regarded as of significance to army animals in this

[1] At the beginning of the present fiscal year (July 1, 1942) U. S. Army detachments were stationed in nearly a hundred different locations in 31 foreign countries. By November, American troops in foreign countries exceeded 800,000, exclusive of Navy and Marine corps personnel.

country are important in some foreign lands, e.g., the British army veterinary service had to contend with rabies in horses in the Balkan Peninsula during World War I.

The information here given is an abridged compilation which it is hoped may prove useful to our several hundred subscribers now in the military service and to civilian practitioners in detecting outbreaks of foreign plagues among civilian-owned animals should any such occur as a result of sabotage. This discussion is not intended as a substitute for the more comprehensive treatises available on various of the diseases mentioned, but rather as a "refresher" on those subjects.

The need during wars for unusual alertness on the part of livestock sanitary officials and veterinary practitioners upon whom devolves the responsibility for the control of disease among food-producing animals which, of course, includes horses and mules since, in large measure, they supply the power necessary to operate farms —the primary food factories, is forcefully, yet conservatively stated, in the following editorial from the *Canadian Journal of Comparative Medicine*:

"Great Wars have always brought about conditions conducive to the spread of infectious diseases. The increased tempo and extension of transportation makes possible a rapid transference of infecting agents and, in some unknown way, conditions arise which favor the spread and increasing virulence of bacterial and virus invaders. Consequently infections which are ordinarily of minor importance assume great proportions and pathological processes previously unknown arise. For example, the cutaneous form of Preisz-Nocard disease had little significance before the last war but during that period it assumed the aspects of a widespread epizootic and caused the loss of thousands of animals. Swine influenza arose during the same period and trench fever was added to the growing list of infections.

"In earlier wars great infections swept over the warring nations and in many instances almost destroyed the herds of belligerent countries. There is every reason to believe that history will again repeat itself and never has the veterinary profession in Canada been presented with a greater opportunity for service than at the present time. On the shoulders of each veterinarian, whether he be practitioner, field officer or laboratory worker, reposes a grave responsibility for the health of the herds and flocks of this country. Every veterinarian is conscious of this and is particularly anxious to do his duty but some find difficulty in discovering how best they may serve.

"Without going into detail it can be said that the first duty of members of the veterinary profession is to be conscious of the likelihood of new infections arising and consequently to be alert. This, of course, pre-supposes that members of the profession fit themselves by a closer study of diseases which are either absent from or seldom found in this country. For instance, the reader may ask himself if he is familiar with malignant catarrh. Could he recognize this infection and differentiate it from rinderpest? Infectious stomatitis and vesicular exanthema are also diseases capable of assuming considerable proportions. Could the reader diagnose these conditions and differentiate them from foot and mouth disease? Other examples might be given but the fact remains that each member of the profession should get down his textbooks immediately and familiarize himself with diseases which are seldom if ever found in this country in order that, should the occasion arise, he will be prepared to recognize them and deal with them effectively.

Dr. C. C. Hastings, secretary of the Illinois Veterinary Medical Association, in a letter to the veterinarians of his State stresses the importance of practitioners remaining on the alert to detect outbreaks of infectious disease among live stock at the earliest possible moment. To quote:

"At this time when human food of animal origin is so important, every possible precaution should be taken to keep our farm live stock healthy and productive. When it is so easily possible to infect our herds and flocks with foreign animal plagues, it is imperative that every veterinarian not actually needed in our armed forces be kept in daily contact with our food-producing animals. Ordinarily a communicable disease is not difficult to control, if proper measures are inaugurated early in the outbreak and vigorously prosecuted.

"Veterinary practitioners are the sentinels of our animal population and a sufficient number should be on duty at all times to guard the health of our farm animals."

For those in the military service there is the further need for renewed study of animal plagues because of their greater severity under wartime conditions and the increased virulence of common diseases under tropical conditions. Mange and ringworm in horses are veritable scourges among military animals. Microbes are still miles ahead of man in adapting themselves to life in the tropics.

Medical Preparedness

The Medical Corps of the Army has made special preparation to meet the medical needs of our troops in every part of the world. The Veterinary Corps cannot do less to prepare its officers to meet the veterinary problems peculiar to the tropics, the arctic, mountain, jungle and desert regions.

A full two years before war was declared the Surgeon General's Office began the collection of medical data from every region on the globe—about the malaria situation throughout the tropics and beyond; dengue fever in China; filariasis in India; sleeping sickness in Africa; frost bite in Iceland; venomous snakes on the Gold Coast, the habitat of poisonous insects and disease conveying lice, ticks, etc. The health organizations in every country were studied and lists made of individuals who might give newly-arrived army doctors information about local disease conditions. Surveys of buildings which might serve for emergency hospitals have been made in all countries and complete information garnered about water supplies, ice plants, etc.

When a troop organization departs for any foreign station, its medical officers are supplied with a mimeographed pamphlet giving pertinent facts about the disease situation at its destination. These facts often include bits of unusual information, e.g., in instructions going with an organization to Africa it was noted that poisonous scorpions frequently crawl into mens shoes at night, for warmth, and bite if a foot is shoved down onto them the next morning. Organizations going to the South Pacific received caution about poisonous sea snakes and clams big enough to close over a man's foot when stepped upon. In the jungles of Malaya and Burma men are attacked by voracious leeches which must not be pulled off lest the head remain buried, but which quickly detach themselves when touched with the lighted end of a cigarette. An organization going to Trinidad carried the information that even in arid regions of the island as much as 70% of the native population is infected with malaria. The reason: The district is infested with a mosquito that breeds in water collected and held by

THE COMMANDER-IN-CHIEF

a parasitic plant that grows in the top of immortelle trees. By cutting these trees about camp areas the mosquitoes were eliminated and the chance of malaria infection greatly lessened. If the coast where the troops are to be landed is mosquito infested the men are cautioned to wear headnets if debarked at night. The neglect of this precaution by British troops in one instance resulted in one-third of the organization acquiring malaria from a single night's exposure. Other organizations are cautioned against bats that carry rabies; to avoid water holes in Australia which are frequented by aborigines (because of hookworm); in other places against flukes that burrow into the skin. They are told what to do in a sandstorm or when lost in a jungle; which fruits to eat and which to avoid and they are given up-to-date information on epidemics present in the districts to which they are to go.

The need of veterinary officers for global information on livestock disease is not less urgent than the need of the medical officers for information on disease conditions that may affect the health of troops.

Trypanosomiasis

Trypanosomiases include a group of serious diseases (surra, murrina, dourine, mal de caderas, tsetse fly disease, African sleeping sickness, etc.) one or more of which may affect almost any mammal. Their distribution is world-wide.

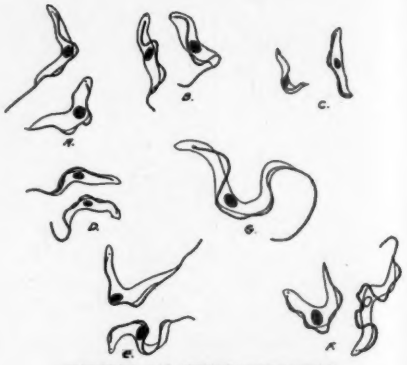
Trypanosomes are one-celled, protozoan parasites belonging to the flagellates. They are usually characterized by a delicate, undulatory membrane attached to the body and a whip-like flagellum that effects movement either forward or backward.

Many species of trypanosomes live in the blood of man and lower animals, always in the plasma—never in the blood cells. Some species are nonpathogenic; a greater number of the known species are harmful. The trypanosomes are responsible for important diseases of domestic animals in the United States and its possesions, including surra, caused by *Trypanosoma evansi*; murrina, caused by *Trypanosoma hippicum;* and dourine, caused by *Trypanosoma equiperdum*. A South American trypanosome, *Trypanosoma equinum* causes mal de caderas in horses and mules over a wide area in that continent. In Africa, *Trypanosoma brucei* causes tsetse disease, *Trypanosoma pecorum* and *Trypanosoma vivax* produce trypanosomiasis in cattle. *Trypanosoma gambiense* and *Trypanosoma rhodensiense* cause sleeping sickness in man.

Usually a given species is pathogenic for one animal and innocuous for another living in close association with the susceptible species. For example, the *T. hippicum* is non-pathogenic for cattle but fatal to solipeds. Big game herbivora, in certain parts of Africa, serve as carriers of *T. pecorum* and *T. vivax* which are highly pathogenic to cattle. Cattle serve as reservoirs for *T. evansi* which is fatal to solipeds and somewhat less pathogenic for camels.

Biting flies are the principal vectors of surra. Various species of tsetse flies are intermediate hosts of the trypanosomes causing trypanosomiasis (nagana) in Africa. Murrina (*T. hippicum*) is transmitted by the bite of the vampire bat as well as by biting flies. Dourine (*T. equiperdum*) is an exception in that transmission is direct from animal to animal through coitus.

Trypanosomes occur in the peripheral blood stream in large numbers only intermittently. If a blood sample be taken when they are plentiful they are easily identified by microscopic examination. To a drop or two of blood freshly drawn (inside the upper lip is the most convenient place to obtain the blood sample) add an equal quantity of 5% solution of sodium citrate; place on a slide and examine under the high power of the microscope. The trypanosomes, if present, are readily seen swimming furiously across the field and knocking the red corpuscles about.



SPECIES OF TRYPANOSOMES[1]

A. *T. brucei* B. *T. vivax* C. *T. congolense*
D. *T. equinum* G. *T. theileri*
E. *T. equiperdum* F. *T. evansi*

Various of the pathogenic trypanosomes are indistinguishable microscopically, but a diagnosis of trypanosomiasis by a blood examination is ordinarily sufficient, since the location and the species of animals affected is usually an index to the disease and to the particular trypanosome.

Most trypanosomes are readily detected by a complement-fixation test. Since they are not constantly plentiful in the peripheral blood stream, this test is an exceedingly valuable one in suspected cases which are negative on microscopic examination.

[1] Courtesy The MacMillan Company, New York.

Mal De Caderas

1. *Synonyms.*—Hip disease, baccy-poy.

2. *Geographical Distribution.*—Mal de caderas is prevalent over the greater part of South America.

3. *Cause.—Trypanosoma equinum.*

4. *General.*—Mal de caderas is a trypanosomiasis affecting horses and mules in the sub-equatorial regions of South America. The parasite very closely resembles that of nagana. Clinically the disease is very similar to dourine. Ruminants and swine are slightly susceptible to the disease by inoculation. Rats and mice may be infected readily by artificial means.

Solipeds cannot be infected by feeding but succumb to hypodermic inoculation. The natural means of transmission is unknown, but biting insects are suspected. In dry seasons there is little of the disease. It is most frequent in swampy areas and during exceptionally wet years. The course of the disease is from one to three months, except in Paraguay where a chronic form called baccy-poy, which means slow emaciation, predominates. The prognosis is always unfavorable.

5. *Symptoms.*—The first symptom noted in an attack of mal de caderas is a gradual emaciation notwithstanding the appetite remains good. Weakness of the hind quarters follows with a staggering gait, dragging the hind feet and giving down in the hocks. The paresis intensifies until the animal is unable to rise when down, and when helped up spreads the hind feet wide apart, stands unsteadily, and later becomes unable to stand at all. The anal sphincter is relaxed and the muscles of the rectum paralyzed in the final stages of the disease.

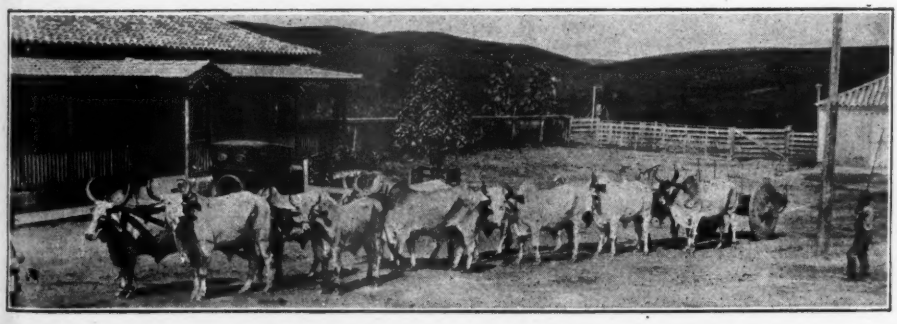
Throughout the course of mal de caderas the temperature fluctuates, ranging from normal in the morning up to 107° F. in the evening. Urticaria-like swellings in the skin are frequent. The urine contains albumin and sometimes blood and there may be a conjunctivitis.

Diagnosis is confirmed with the finding of the trypanosome by microscopic examination of the blood, or by inoculation of mice or rats. The trypanosome is plentiful in the peripheral blood stream only during exacerbations in the attack and can be demonstrated with the microscope only at such times.

6. *Treatment.*—No satisfactory treatment of mal de caderas is known. As with surra, human blood serum will destroy the organism but, of course, does not constitute a practical treatment.

A variety of arsenical and coal tar dyes have been recommended but have not withstood the test of time. Trypanred is effective against the organism in rodents.

7. *Prophylaxis.*—No successful preventive measures are known. Keeping the animals away from swamps should lessen the amount of infection acquired. Protection from biting flies by fly repellant applications, always worth while in the tropics, may help to prevent mal de caderas.



The hardy zebu ox is well adapted for draft in Brazil. It is immune to mal de caderas

Surra

1. *Synonyms.*—M'bori, rotten disease, el debab.

2. *Geographical Distribution.* — All of Southern Asia, Burma, French Indo-China, India, Arabia, Iraq and Iran, etc. Many of the islands of the East Indies, parts of Africa.

3. *Cause.—Trypanosoma evansi.*

4. *General.*—The trypanosome that causes surra is transmitted from animal to animal by biting flies, of which the tabanids are the most important. There is some evidence that these flies serve as both mechanical carriers and intermediate hosts of the trypanosome, but such is not generally thought to be the case. Fleas also, transmit the disease among dogs, rats and other rodents. Dogs sometimes acquire the disease also from eating the carcasses of animals dead of it. Dogs, monkeys, rodents, cattle, water buffalo and camels may act as carriers of the trypanosome. This was the first pathogenic trypanosome discovered. The discovery was made in India in 1880 by a veterinary officer of the British Army—Griffith Evans.

In regions where surra is indigenous it is usually mild or sub-clinical among the native ruminants. However, when introduced into new areas it may be destructive to the cattle. Under special circumstances the mortality may be high among camels, although these animals commonly carry the infection in their blood and serve as a reservoir of the trypanosome dangerous to other animals, without themselves exhibiting marked clinical symptoms.

The mortality approaches 100% among solipeds when introduced into new areas such as is likely to be the case during military campaigns. Military animals from districts where the disease does not exist are similarly affected when taken into districts where the disease is enzootic. In regions where biting flies are plentiful, surra has at times almost wiped out the horse population. As would be expected from a disease transmitted by biting flies, it is most prevalent at the close of, and immediately following, the rainy season and on low marshy land and along streams with tall vegetation that may harbor Tabanidae.

Armies operating in India and southwest Asia have usually found it necessary to augment their transport service with native camels and oxen. The majority of both animals in that section carry the trypanosome in the blood. They may or may not present clinical symptoms of the disease. However, when subjected to hard work the camels break down rapidly and suffer from clinical surra. More than 40,000 animals were lost by the British from surra in a single campaign in Palestine during World War I.

Surra is an outstanding example of a disease in which the veterinary service of a command not only has the obligation to prevent the infection of military animals from native animals, but also to protect the civilian-owned animals against infection from army animals in districts where the disease is not enzootic among native animals.

5. *Symptoms.*—The period of incubation is about 10 days. The onset of the disease is signalized by a harsh staring coat and in time the hair falls out in patches. The soliped loses condition rapidly and becomes "tucked up" to a remarkable degree, the eyes water and there is a thin discharge from the nose. Early in the attack weakness of the hind quarters becomes manifest. This progresses to partial paralysis; the animal dragging its feet and swaying as it walks. The anus is retracted and the sphincter relaxed.

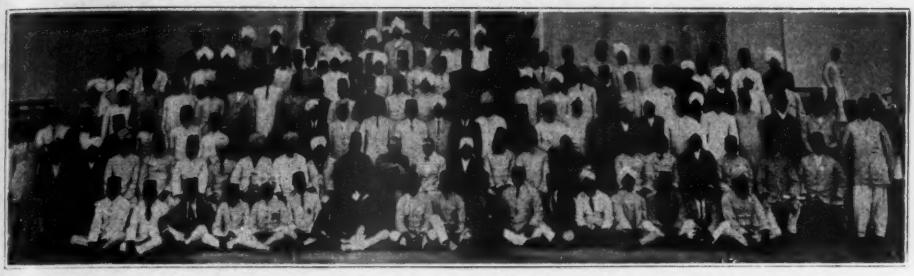
Early in the attack there is edema of the sheath and inconstant swelling of the hind limbs. Edematous swellings commonly occur also on the brisket and in other dependent locations. These lesions grow progressively more marked with the progress of the disease.

The appetite remains good up until a few hours before death. Even when the animal is no longer able to stand and is suffering from extreme anemia and debility it will lie and eat almost greedily.

The temperature in surra is not uniform in characteristics. Early in the attack it may fluctuate between normal and about 103°F.

Later on it is prone to become sub-normal.

The diagnosis is confirmed by finding the trypanosome, *Trypanosoma evansi* (which is indistinguishable microscopically from *T. brucei*) in the blood. Many, a few, or perhaps none at all, may be found; the number apparently having little relation to the severity of the clinical symptoms. The experience of our army veterinarians in the Philippines demonstrated that the complement-fixation test is an exceedingly valuable means of not only diagnosing the disease but also detecting the carriers of *T. evansi* among the cattle and water buffalo. An antigen for this test was developed by Col. T. K. H. Reynolds, V. C.



Annual Meeting of the United Provinces Veterinary Medical Society of India

6. *Treatment.*—The treatment of horses and mules affected with surra is futile as practically all succumb in about six weeks.

Ruminants are less severely affected; with symptomatic treatment, rest and good food they recover in six to ten weeks. However, recovered animals continue to carry the trypanosome in the blood and, hence, constitute a hazard to susceptible animals, with which they may come in contact.

Army regulations require that immediately surra is diagnosed in an army animal, it shall be destroyed.

7. *Prophylaxis.*—Since biting flies are the agents that transmit *T. evansi* the problem of control and prevention of surra is considerably simplified. The tabanids, or horse flies—the principal vectors of surra, harbor in tall vegetation along streams or near swamps. Such places can be avoided or the vegetation can be cleared away before the horses are brought near them. If crossing such belts be necessary it should be done at night to avoid the flies. Smudge fires may be used when it is necessary to water animals where vegetation is tall.

These flies travel but a short distance and infection from native animals may be avoided by keeping them distant from military animals. It is essential that the horse bivouac be located as remote as possible from camel or cattle camps. One mile is considered a safe distance if no animals traverse the interspace.

Stomoxys, or stable flies, can be reduced in number by cleanliness about the stables and picket lines, and by the use of fly traps. The tabanidae (horseflies) by far the most important agent in the transmission of surra are readily reduced in number by killing them as they attack the animals. These measures afford considerable protection from the disease.

Suspected cases or contact animals should be kept in screened stables or isolated at least a mile from other animals.

In the presence of an outbreak of surra, a microscopic examination of the blood of all animals in the immediate command should be made daily, and the temperatures should be taken twice daily. Complement-fixation tests should be made of blood of suspected cases which are negative on microscopic examination. All animals, in the blood of which trypanosomes are discovered, and those reacting positively to the complement-fixation test should be destroyed immediately. All others showing a temperature above normal should be isolated.

Murrina

1. *Synonyms.*—None.

2. *Geographical Distribution.* — Central America, Panama, northern South America.

3. *Cause.—Trypanosoma hippicum.*

4. *General.*—Murrina is a fatal trypanosomiasis of solipeds. It is indigenous in the Canal Zone and the Republic of Panama and occurs in some other Central and South American Republics bordering on the Caribbean Sea. It resembles surra closely but is more chronic. House flies have been incriminated by some investigators as carriers of this disease but others hold that it may be transmitted direct from one animal to another. It is readily inoculable, however, and biting flies, particularly the tabanids, which are regarded as important agents in its transmission, should be avoided if at all possible.

The vampire bat (*Desmodus rotundus*) is susceptible to the trypanosome that causes murrina and it succumbs to the infection. It is generally thought, but perhaps not definitely proved, that this bat while carrying the trypanosome in its blood, may infect susceptible animals on which it feeds. In fact this bat is regarded by many as the most important agent in the transmission of the disease since it feeds upon cattle and horses indiscriminately. Cattle are unaffected by this trypanosome but carry it

In the West Indies stallions are preferred to mares or geldings for riding

in their blood for life, thus constituting an ever-present reservoir for the infection.

5. *Symptoms.*—About five days after infection, animals exhibit lassitude, weakness and fever. One to two weeks later subcutaneous edema appears underneath the chest and abdomen and in the sheath. Both the fever and the edema are of an undulant type, diminishing and recidivating throughout the course of the disease. Edema of the extremities and hemoglobinuria also ensue as the disease progresses. The appetite remains fair but there is a progressive loss

Common type of horses in the West Indies

of weight and an increasing anemia throughout the long course of the disease which runs from two to three months and invariably ends in death.

6. *Treatment.*—No treatment for murrina is known that is of any value.

7. *Prophylaxis.*—No measures effective in preventing murrina in districts where it is enzootic are known, other than keeping the animals in screened stables when not in use. As this is seldom, if ever, practicable in military campaigns, loss from this disease is to be expected. Early disposal of infected animals and keeping native cattle distant from horses and mules lessen the opportunities for infection.

The trypanosome, when found in the blood, confirms the diagnosis, made upon clinical symptoms. However the parasite is irregularly found in the blood stream. Experience in Panama demonstrated that the complement-fixation test is a valuable means of diagnosing murrina early in the attack and is routinely employed in that country.

Nagana

1. *Synonyms.*—Tsetse fly disease, African trypanosomiasis.

2. *Geographical Distribution.*—South and East Africa.

3. *Cause.—Trypanosoma brucei.*

4. *General.*—Nagana is a trypanosomiasis that, clinically, closely resembles surra. It is, however, limited to belts south of the equator in Africa—areas inhabited by the tsetse fly which is the only important, if not the sole agent, of transmission of the disease among animals. This fly acts as a vector and also as an intermediate host of the trypanosome. The disease is highly fatal to horses. A similar disease caused by *T. pecorum* or *T. vivax* is equally fatal to cattle and is transmitted in the same way as nagana. These trypanosomes together with the tsetse fly, have prevented the settlement of great areas of the equatorial belt of Africa and beyond. Trypanosomiasis has been responsible for disaster to military campaigns in that portion of the world.

During World War I, the British veterinary service estimated in advance that the East African campaign would result in a horse mortality of 30% per month and a total mortality of 100%. The prediction proved to be well founded since, the actual monthly mortality ranged from 32 to 38% of the animals taken into tsetse fly belts, and all were lost eventually.

5. *Symptoms.*—About 10 days after an animal is "fly struck" a syndrome sets in that is, in practically all respects, identical to that of surra. At first there is elevated temperature and staring coat; watery discharge from the eyes and nose, swelling of the sheath—later of the hind legs, and a loss of flesh. Sir David Bruce, discoverer of the trypanosome and for whom it is named, described the final stages in these words:

"He is a scarecrow, covered with harsh, rough hair, which has fallen out in places. His hind extremities and sheath may be more or less swollen, sometimes to a great extent, and he may become quite blind. At last he falls down, unable to rise, his breathing becomes shallower and shallower and he dies exhausted. During the illness he has shown no signs of pain and up to the last day has had a fairly good appetite."

Tsetse-fly
Glossina morsitans
(three times natural size)

Courtesy D. Appleton-Century Co.

Diagnosis is confirmed by finding *T. brucei* in the blood.

6. *Treatment.*—No treatment of any value is known for nagana in horses, mules or asses. One gram of tartar emetic, in aqueous solution (4%) administered intravenously every fifth day, is recommended by Edmonds for trypanosomiasis of cattle caused by *T. pecorum* or *T. vivax.*

6. *Prophylaxis.*—The tsetse fly loves shade and will not venture into open wind-swept areas. Keeping the animals away from timber belts or, when necessary, crossing them at night, meets with considerable success in preventing nagana. When animals are watered at fly-infested streams a smoke screen affords protection. The fly will bite at night, particularly in moonlight, if disturbed, although much less than in the day time. It has been noted that when travelling at night, animals toward the rear suffer far more from bites than those at the head of the column. It is suggested that the less valuable animals be put at the tail of the column. When animals are fed well, 10gm of arsenic daily will drive the trypanosomes from the peripheral circulation and thus lessen their infectiousness.

Since some native animals, including the big game animals, constitute natural reservoirs of the *T. brucei, T. pecorum, T. vivax* and other trypanosomes, all tsetse flies should be regarded as dangerous. In the acute stages of the diseases the organisms occur in the peripheral blood in enormous numbers and it is thought, but not proved, that any of the biting flies may carry the infection mechanically from the acutely sick to nearby well animals at such times.

Dourine

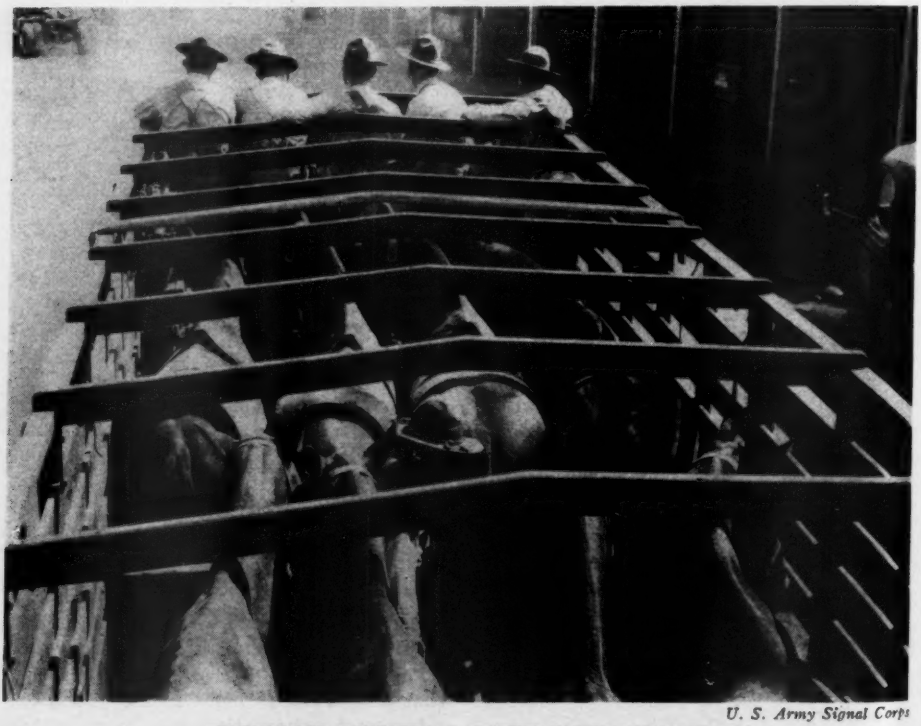
1. *Synonyms.*—Maladie du coit, equine syphilis, breeding paralysis, genital glanders.

2. *Geographical Distribution.* — Southern and eastern Europe, Africa, Asia, Brazil, Chile and a few districts in the United States.

3. *Cause.—Trypanosoma equiperdum.*

4. *General.*—Dourine is of little importance to military forces, except as it interferes with horse-breeding. Its chief interest to American veterinarians lies in the fact that it is the only trypanosomiasis of domestic animals that occurs in the continental United States. It was brought to this country from France in a stallion and first recognized in 1886 by W. L. Williams, then practicing at Bloomington, Illinois. Outbreaks of dourine have since occurred in Nebraska, South Dakota and Iowa, and it has been found among wild horses and animals belonging to Indian tribes in several of the Mountain States. At present it exists in only a few restricted localities in Arizona and California from which its eradication is probable in the near future.

Dourine is unique among trypanosomiases in that it is, in the main, communicated directly from animal to animal through coition and to a much less extent, if at all, by biting insects. The mortality rate is high, often 50% and sometimes much higher. The sterility rate as a result of infection is still higher. The earlier symptoms involve the genital organs in both sexes. Later the nervous system is involved. Rather rarely geldings contract the disease. Affected animals should be destroyed. Clinical diagnosis is sometimes difficult. A complement fixation test is of great assistance in the control and eradication of this disease.



U. S. Army Signal Corps

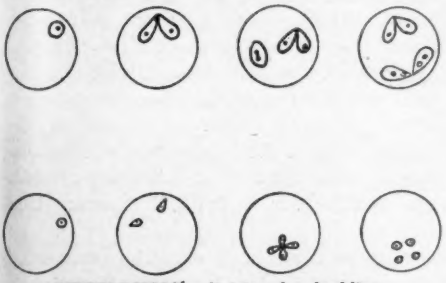
SEMI-TRAILER CARRYING A PORTEE CAVALRY SQUAD

These vehicles transport eight men and eight horses, together with equipment for both men and animals

Piroplasmosis

The piroplasmoses include a considerable group of diseases of mammals. They are caused by protozoa, that live and multiply within the red blood cells, thus destroying them and bringing about a severe anemia. The disintegration of the erythrocytes sets hemoglobin free. Much of it is eliminated in the urine resulting in hemoglobinuria; hence, a common name for babesiosis in cattle is red-water. Hemoglobin converted into bile frequently gives rise to icterus and is responsible for biliary fever in horses and malignant jaundice in dogs.

The piroplasmas are roundish, pear, ring, or rod-shaped (piro=pear, plasma=formed), unicellular organisms. They are transmitted naturally from animal to animal through the bite of ticks, and the diseases they cause may be communicated readily, between animals of the same species, by the artificial injection of blood containing the parasites.



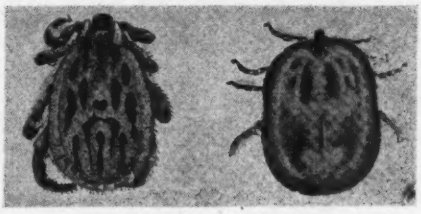
PIROPLASMAS[1]—division by budding
Above. *Babesia bigemina*. Below. *Babesia equi*

The piroplasmoses of cattle are more widespread than is equine piroplasmosis. Enzootic hemoglobinuria in Europe (*Babesia bovis*), Rhodesian redwater in Africa and Texas fever (*Babesia bigemina*), in America, are typical examples of such diseases in cattle. Piroplasmosis occurs also in sheep and goats (*Babesia motasi*), and in dogs (*Babesia canis, B. gibsoni*).

In horses as in cattle, in a region where piroplasmosis is enzootic, native animals suffer from a mild chronic form of the disease but, animals newly taken into such areas suffer acute attacks. Animals that recover from either acute or chronic attacks carry small numbers of the piroplasmas in the blood for long periods.

[1] Courtesy The MacMillan Company, New York.

Two families of ticks, Argasidae and Ixodidae, about 10 genera and many species possibly may be involved in the transmission of piroplasmas among the mammals. A lesser number have been proved actually to inoculate animals.



***Dermacentor reticulatus*.[1] A, Male. B, Female. Dorsal view. *B. caballi* is conveyed by the imago of *Dermacentor reticulus* according to Marzinowski and Bieltzer in South Africa but du Toit found that the nymphs of the tick also carry the disease. The parasites are transmitted by the female to the next generation**

Ticks known to spread equine piroplasmosis are: *Rhipicephalus evertsi* (South Africa) and *R. bursa* (Italy) for the *Babesia equi* and *Dermacentor reticulatus* (Russia) and *Margaropus annulatus* (Italy) for the *B. caballi*. Ticks that transmit the piroplasma of bovine piroplasmosis are: *Margaropus* (*Boophilus*) *annulatus* (U. S.), *R. appendiculatus* (South Africa) and *Haemaphysalis punctata* (northern Europe) for the *B. bigemina* and the *Ixodes ricinus* and *H. punctata* for the *B. bovis*. The transmission of piroplasmosis of sheep and goats is effected by *R. bursa* and of dogs by *H. leachi*, *R. sanguineus* and *D. reticulatus*.

[1] Hutyra, Marek and Manninger. Courtesy Alexander Eger, Publisher, Chicago.

Equine Piroplasmosis

1. *Synonyms.*—Biliary fever, equine malaria, babesiasis, babesiosis, nuttalliasis equorum.

2. *Geographical Distribution.*—Italy, Russia, the Balkan Peninsula, the Middle East, India, a large part of Africa and Central and South America.

3. *Cause.*—*Babesia* (*Nuttalia*) *equi* and *Babesia* (*Piroplasma*) *caballi.*

4. *General.*—Equine piroplasmosis is due to either of two species of piroplasmas. The *caballi,* a large pear-shaped organism, usually affects animals in hot weather and the *equi,* a small, round, oval or pear-shaped organism, only two microns in diameter, which is more prevalent in the spring. Both types of the organism are inoculable by subcutaneous or intravenous injection and both are naturally transmitted by the bite of ticks and possibly also by bites of flies.

In the Boer War the loss of British horses from piroplasmosis was very great. In World War I it was one of the principal causes of loss of British animals in summer campaigns in Palestine, Persia, Southwest Africa and Mesopotamia. It usually spreads rather slowly but may develop in a large number of animals within a few hours. The disease causes a long period of incapacity and may be an important cause, in fact the chief cause, of inefficiency in army animals in districts in which it is indigenous. Animals that have recovered carry the protozoa in the red blood cells for a long period, perhaps for life, and are thus a source of infection for animals with which they are associated. Further, such animals are prone to suffer relapses from overwork, exposure, or other hardship. Infections may be so mild in vigorous animals as to pass unnoticed and thus cause extensive spread of the disease. Such infections, however, do not remain sub-clinical. After running a chronic course, they result in anemia and debility. Should the animals contract an intercurrent disease or be exposed to severe hardship, serious illness is prone to develop. The incubation period of babesiosis is from one to three weeks.

5. *Symptoms.*—Pronounced dullness and depression throughout the attack characterize piroplasmosis of the horse. There is a continuous high fever during the acute stage, which lasts about six days. Thereafter, the temperature ranges from 102.5 to 104° F. The appetite is subdued and thirst augmented. The urine is increased in amount and high colored but in horses is seldom red as is the case in cattle. Visible mucous membranes are icteric or ecchymotic. There is a marked destruction of red blood cells and toward the end, a striking anemia. The disease produced by the *equi* is more severe than that caused by the *caballi* species.

Coincident with the high temperature the animal, if worked, suddenly shows great exhaustion and cardiac weakness. Exhaustion results also from exposure to hot sunshine. Later there are hemorrhages into the conjunctiva, icterus, polyuria, dark discolored urine, dyspnea, edema, emaciation and acute anemia. After the acute stage has passed the fever usually exhibits a periodicity, abating for a short time every third day.

With rest and good care the prognosis is favorable, but under less salubrious circumstances mortality may reach 50 and even 80% of the animals attacked. If the affected animals are worked during the pyrexial stage, sudden death is likely to ensue. Death occurring later is preceded by extreme exhaustion and debility. Diagnosis is confirmed by finding the pear-shaped piroplasmas in the erythrocytes on microscopic examination.

6. *Treatment.*—Free the animal from ticks, stable in the shade, give the best feed possible, provide complete rest and administer heart stimulants (digitalis, camphor).

Trypanblue has been used and highly recommended in various countries for *B. caballi* infections. It is given intravenously, 200cc of a 2% aqueous solution. Arsenous acid, atoxyl, mercury biniodide and potassium iodide all have been recommended. Trypanred also has its advocates, as does one gram doses of trypaflavine intravenously in 20cc of distilled water. Udall recom-

mends one gram of trypaflavine intravenously in 1000cc of distilled water. None of these treatments possess any value where the infection is *B. equi*. More recently Yakimov in Russia has reported encouraging results in the treatment of *B. equi* with acriflavine.

During World War I, the British veterinary service relied entirely upon intravenous injections of quinine acid hydrobromide and reported that few animals which received injections early in the attack and had good care thereafter were lost. Thirty grams of the drug was given in 30cc of water once a week.

American Army veterinarians experienced excellent results in Panama Canal Zone from the use of arsphenamine and neoarsphenamine. The use of one or the other of these drugs is now routine treatment of the disease in our army. The usual dose is 3.5gm in 100cc of distilled sterile water, administered intravenously. This injection is usually repeated three times at 48-hour intervals and, after a rest period of 10 days to two weeks, a second series of injections is given.

Under any treatment shade and a plentiful water supply are indispensable to success. Early in the treatment, an 8-ounce dose of epsom salts is desirable. This should be followed by a 4-ounce dose daily for three days and, if needed, until the pyrexia subsides. Full therapeutic doses of ammonium carbonate twice daily are reported to be beneficial throughout the active stage of the disease.

7. *Prophylaxis.*—Infected ticks, of course, should be avoided. Picket lines and stables that have been used for infected animals within several weeks should be proscribed. Where such picket lines must be used they should be thoroughly cleaned, covered lightly with hay or straw, and burnt over. Freeing stables of ticks is accomplished only with extreme difficulty.

Where the disease is indigenous, the ticks should be removed from the horses several times daily. They are usually attached inside the concha, in or under the mane and around the dock and are difficult to locate. Small immature ticks (usually found about the dock) are as dangerous as the larger ones. The ticks collected should be burned.

Some success has attended the injection of 0.5cc of blood of young horses or burros that have recovered from the disease (carriers). The injection should be made in winter. The animal should then be placed in an infected pasture. The loss from this immunizing treatment, which simply amounts to inoculating the animal at the season most favorable to its recovery and at a time when it can be given the best care, averages about 3%.

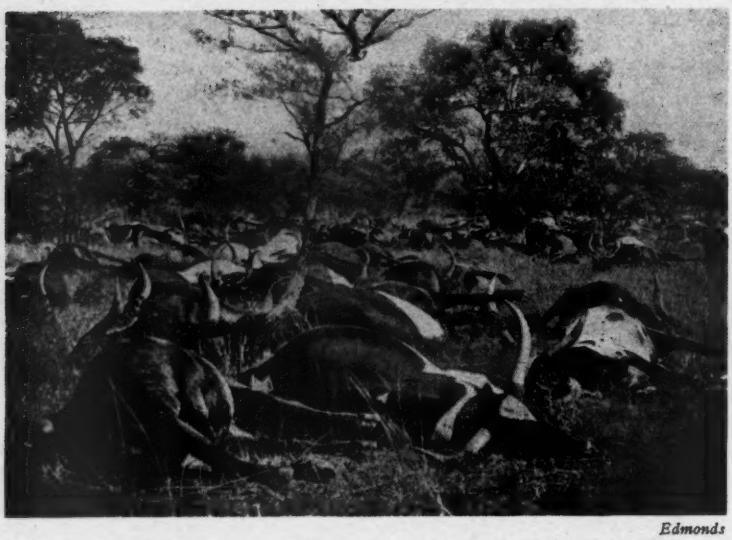
Theiler recommended the inoculation of horses against *B. equi* with 1cc of blood from artificially infected asses after the fourth passage. The inoculation has been reported to cause no clinical reaction.

As is the case with piroplasmosis in cattle, horses that have recovered from an attack of the disease are immune so long as they remain in contact with infection. This tolerance of the organism can be broken down, however, by inadequate feed, overwork, exposure and other hardship.

LOUISIANA ARMY MANEUVERS, 1941

Horses being watered at the 30th Veterinary General Hospital at its camp on the Calcasieu River. Water was pumped from the river (by a gasoline motor) into canvas watering troughs to which the horses were led from the picket line four times daily. In this camp the number of animals averaged 300 and required the pumping of approximately 3000 gallons of water per day

Rinderpest



Edmonds

RINDERPEST IN BECHUANALAND PROTECTORATE: CATTLE SHOT AND DEAD FROM THE DISEASE
In one small valley 5,000 cattle were said to be lying similar to the above

1. *Synonyms.*—Bovine pest, cattle plague.

2. *Geographical Distribution.*—In nearly all of Asia, Ethiopia, Brazil, and many islands of the southwest Pacific, rinderpest is enzootic. Extensive outbreaks in Europe usually occur during wars in that area.

3. *Cause.*—A filterable virus.

4. *General.*—Throughout historical times rinderpest has been the most destructive disease of cattle. It occasionally affects other ruminants. It occurs in two forms, an epizootic, quiescent type that spreads slowly and from which most of the affected animals recover and an epizootic type which spreads with great rapidity, involves practically every bovine animal in its path and occasions a mortality approaching 100%.

For more than a thousand years rinderpest ravaged the cattle herds of Europe and, on various occasions during the great wars, completely destroyed the cattle industries of whole nations. This happened in Italy and also in Egypt late in the 19th Century. Within three years (1896-98) it swept through East and South Africa, from Somaliland to Cape Colony, destroying 97% of the cattle and most of the big game animals in Rhodesia. It is prone to assume the epizootic form under circumstances of war and to handicap seriously, a military force depending upon oxen for transport or cattle for food.

5. *Symptoms.*—The onset of rinderpest is signalized by a rise in temperature to about 105° F., increased pulse rate and staring coat. After three to five days characteristic symptoms appear; swelling and partial closing of the eyelids, epiphora and watery discharge from the nostrils. The discharge becomes thicker and more profuse, mucoid, then purulent in character. The inflammation of the nasal, oral and, in females, vaginal mucous membranes, becomes diphtheritic. Removal of the pseudo-membrane reveals large ulcers.

The appetite remains fairly good, until the mouth lesions develop. At which time the temperature falls to normal or below. As the course of the disease continues the animal becomes weak, the ears droop, the partially dried discharges hang in long strings from nose and mouth, and usually

death occurs in from 7 to 14 days. Animals that survive, begin to improve after two weeks and, except for the loss of flesh, the recovery is complete in three to four weeks.

6. *Treatment.*—No known drugs are of any value in the treatment of rinderpest. Antirinderpest serum definitely ameliorates the attack if given early. If given during the period of incubation, it prevents the disease.

7. *Prophylaxis.*—Rinderpest is so highly infectious that its control by quarantine offers great difficulty. However, prompt killing and burial of all infected and in-contact animals, quarantine against the movement of all ruminants and thorough disinfection of the area and of all articles that may have been contaminated by infected animals, serves to suppress an outbreak. These measures are more effective in rinderpest than in some other diseases, notably foot-and-mouth disease, since infection derives chiefly from the diseased animal and its products—hide, wool, milk, manure, etc., and infrequently through intermediate agencies—contaminated feed, corrals, water, attendants, etc.

When available, antirinderpest serum may be used either alone or with virus, on exposed or surrounding herds. The immunity from serum alone lasts 10 to 20 days; from serum and virus for the life of the animal. A disadvantage of the simultaneous vaccination is that the serum is often of low potency and reactions following serum-virus vaccination are likely to be severe; rather heavy losses being common.

The bile of affected animals may be used as a vaccine with fair prospects of reducing the loss. The bile should be collected only from cases that have survived seven days or longer from the onset of the disease. It must be obtained aseptically and without admixture of blood. The dose is from 20 to 100cc, given subcutaneously. From 10 to 20 animals can be protected from the bile of a single animal. By mixing the bile with one-half its volume of glycerine it may be preserved for weeks. This method of rinderpest control was employed on hundreds of thousands of animals in South Africa, and saved them. The bile vaccine method is now considered obsolete, but conditions might arise which would justify its use until better means could be employed. It possesses the advantage in an emergency, that the necessary material for the vaccination is always available on the spot.

Recently goat blood virus and goat tissue virus has come into wide use in India as a preventive of rinderpest in cattle. It is too early to form definite conclusions, but these vaccines of caprine origin give much promise of being a practical method of controlling the disease in cattle. It is less

ANTI-RINDERPEST VIRUS-SERUM VACCINATION IN INDIA

successful in the carabao; the loss in this animal as a result of vaccination with goat virus sometimes reaches as much as 20%.

The development of goat blood and goat tissue vaccine has been proclaimed by the Indian Council of Agriculture to be the most important development in veterinary medicine since the beginning of the present century. The best results have attended its use simultaneously with a dose of anti-rinderpest serum.

The immunity from bile injections lasts for several weeks to several months. Immunity from goat-virus vaccination is long lasting.

No other method of rinderpest control has ever shown results comparable to those achieved in the Philippine Islands by the use of the tissue vaccine developed by Major (now Brigadier General) R. A. Kelser. This vaccine is readily prepared, keeps well, is safe to use and highly effective. With it rinderpest which had been a plague, seriously handicapping agriculture in the Islands as far back as their history extends, was completely eradicated in a period of about five years. The Kelser vaccine seems never to have been used extensively in India, through the ages, the happy hunting ground of rinderpest virus. Regardless of this fact American veterinarians will give the Kelser vaccine, if available, first place in any plans for rinderpest control. Its record is unassailable.

The Camel in War

No military campaigns in the Middle East, India or Somaliland have been able to dispense with the use of camels for transport, and commonly these animals have been used also for mounts. Perhaps the present highly-mechanized armies will not require them in any considerable numbers but again they may be necessary to maintain the flow of supplies to the fighting troops.

The principal communicable diseases of the camel—surra, rinderpest, anthrax, scabies, and foot-and-mouth disease—have been discussed elsewhere. Two other possible infections—barsati and styes (hordeolum)—should be mentioned. Common non-infectious ailments are cracked sole, tail sloughing and abscess in the pads on the sternum, elbow, stifle and knee.

In the purchase of camels for military use selection is far more important than is the case with horses, since camels possess little tolerance for changes in climate or conditions. Animals from the Nile Delta are useless on the desert or in the Middle East. Camels from hot districts cannot be used where it is cold nor can animals from the cool foothills stand the heat of India or Arabia.

The camel is of no military value until it is six years of age, and is not in prime until it is nine. It requires bulky food, 25 pounds of dry forage or 40 pounds of green forage daily. At hard work the camel requires also a supplement of grain but this must not be overdone. Five or six pounds of barley is the maximum. One pound of sugar daily is a valuable addition to the ration. It is customary to graze camels from 8:00 or 9:00 a.m. till 5:00 p.m.

Pack animals carry from 250 to 450 pounds, 20 miles daily. They should be watered once daily when water is available, but Indian camels can do with water every other day, Arab and desert camels every third day and Somali camels every fourth day. If these periods are extended the loss of condition is rapid and debility and total incapacity an early sequel.

Foot-and-Mouth Disease

Synonyms.—Hoof-and-mouth disease, aphthae epizootica, aphthous fever.

Foot-and-mouth disease is widespread throughout the world. North America experiences only occasional outbreaks. The disease is constantly present in Europe, Asia, and Africa but Australia is free from it.

This disease is quite apt to invade areas occupied by military forces and, owing to the interference with civilian veterinary sanitary services during a general mobilization, to prove uncontrollable. It is an obligation of the military veterinary service, to render to civilian authorities all assistance possible in prosecuting control measures.

Foot-and-mouth disease is due to a filterable virus, of which there are several types. It affects practically all cloven-hoofed animals. Different outbreaks may affect animals differently, thus, although in cattle mouth lesions usually predominate, there have been outbreaks in which lameness predominated. Owing to secondary infections many animals may lose their hoofs. In swine, foot involvement is prone to predominate. In the extensive outbreak of foot-and-mouth disease that occurred in Central Europe in 1937-1938, infection of the udder occurred in a majority of the cows affected. Approximately 25% of the dairy cows in Germany were ruined as milk producers. This resulted in an acute shortage of dairy products there in the summer of 1938.

The symptoms and treatment of the disease as encountered in war present no divergence from those ordinarily experienced in time of peace, and are well known to American veterinarians. The prevention and control of foot-and-mouth disease during war differ from the methods employed in peace time only because of the difficulties inherent in a depleted personnel for handling livestock sanitary police measures and the interference with quarantines which is inseparable from military occupation.

In Germany vaccination as a means of preventing foot-and-mouth disease is widely employed. Other countries have had little success with the vaccine. The failure to suppress the 1937-38 outbreak in Germany by the use of the vaccine was attributed to (1) the extreme infectivity of the disease in that outbreak causing a rapidity of spread theretofore unknown and (2) to the small amount of the vaccine available when the outbreak occurred; the vaccine having been developed only recently. In England and the United States the slaughter of affected and exposed animals is relied upon for eradication. Denmark relies upon vaccination, but like Germany was unready in 1938.

Lesions of the hoof in foot-and-mouth disease

Foot-and-mouth disease can be readily introduced and disseminated maliciously, and can cause great disorganization and loss to the cattle industry of any country. It has therefore received considerable discussion in the veterinary press of our enemies as a possible agent of biological warfare. Among its adaptabilities for the purposes of sabotage are: (1) The virus is tenacious of life, (2) it spreads with extreme rapidity, (3) cattle, sheep, goats, swine and even wild deer are susceptible, (4) it can be spread from market centers to break out simultaneously over hundreds of thousands of square miles, (5) it so closely resembles two other stomatites as to easily escape recognition until the epizootic has gained great headway, (6) it depletes rapidly the food supply (meat and dairy products) and wealth of the area it invades and (7) it disorganizes the marketing of food animals.

Infectious Encephalomyelitis

1. *Synonyms.*—Mad staggers, blind staggers, stomach staggers, sleeping sickness, cerebritis, horse plague. In man: Encephalitis, sleeping sickness.

2. *Geographical Distribution.* — Probably world-wide.

3. *Cause.*—A neurotropic virus or viruses.

4. *General.*—In the control of encephalomyelitis among army animals the veterinary officer has a responsibility not only for conserving the animal strength of the command but for protecting the military personnel from a possible source of infection of serious import. It is true the army veterinary service has a similar responsibility in the control of some other diseases of animals—anthrax and rabies, for example. But in the matter of encephalomyelitis the responsibility may be greater for, whereas the mortality in persons from rabies in the United States averages fewer than a hundred annually, the same virus that causes encephalomyelitis in horses was responsible for a greater number of deaths of persons in a single state in 1941.

There are three types of encephalitis in man—lethargic encephalitis or sleeping sickness; St. Louis encephalitis, and the equine type encephalitis. All are new diseases or, at least, diseases that have been recognized only recently. Lethargic encephalitis was first recognized during the winter of 1916-17. It was a serious disease among soldiers in Europe during World War I. It appeared in this country in the winter of 1918 and every winter for a decade cases occurred in the United States. This type occurs only in cold weather and is not known to affect horses. The cause of lethargic encephalitis has not been determined.

St. Louis encephalitis was first recognized in 1932. Severe outbreaks occurred in St. Louis, Missouri, in the summer of 1933 and 1937 with sporadic cases in various parts of the country in between those years and since. It is due to a virus to which horses are susceptible. It is a summer disease.

Equine type encephalitis in man, also a summer disease, was first supected by Karl Meyer in 1932, when he saw two cases. Both victims had been closely associated with horses suffering from encephalomyelitis. However, Meyer had no opportunity to prove that the equine virus was responsible for the ailment. In 1937 six cases in man occurred in Minnesota and several cases were reported unofficially from Manitoba. In 1939 and 1940 the incidence was but little higher. In 1941, this country experienced the most extensive outbreak of encephalitis in its history—4000 cases with 450 deaths in the plains section from Colorado to Saskatchewan. In North Dakota, there were 1080 cases and 104 deaths, in Minnesota 851 cases and 65 deaths. Had the same incidence rate, that occurred in North Dakota, prevailed over the whole of the United States there would have ben 230,000 cases in man and, had the average mortality obtained, there would have been 25,000 deaths.

Clinically, St. Louis encephalitis and the equine type of the disease are indistinguishable in man. In horses St. Louis encephalitis is believed to be usually subclinical, from natural infection. However, from intracerebral inoculation the disease resembles encephalomyelitis and may be fatal. The death rate in persons from the western equine type virus averages 11% and from the eastern type 73%. In the horses, mortality from each type of the equine virus is considerably higher. Fortunately, there have been relatively few cases caused by the eastern strain of virus in either man or horses.

There is some evidence that the horse is the source of the equine type of encephalitis infection in man but a great deal more that it is not. However, the question is not settled and, until the facts are known, the army veterinary service can relax no efforts to afford military animals complete protection from the disease; as the experience of 1941 has shown, the equine type of the virus may constitute a grave potential hazard for the military personnel. Federal regulations require that all laboratory employees engaged in the manufac-

ture of encephalomyelitis vaccine be immunized against the disease.

The information extant on neurotropic viruses is nearly all of recent development and is being added to rapidly by research. Some conceptions held at the present may have to be revised in the near future.

Neurotropic virus diseases of horses occur in most countries. They possess many clinical similarities but exhibit antigenic difference, different mortality rates and perhaps some other characteristics peculiar to each type of virus. The two types occurring in North America, Borna disease of Central Europe, a type in France, two types in India and one in the Northern nations of South America, seem to be due to seven different, but related, strains of neurotropic virus. However, some regard the virus of Borna's disease as being unrelated to the others.

Encephalomyelitis of horses is by no means a new disease. The origin of the terms "mad staggers" and "blind staggers" is lost in antiquity. In India mention of such diseases antedate the Christian era.

Throughout the long record of such diseases they have occurred in waves—epizootics. This feature was largely responsible for calling them "forage poisoning." It afforded an explanation for widespread outbreaks when infection could not be incriminated.

Another reason for confusion as to the etiological factor is the existence in North America, and perhaps elsewhere, of a disease identical to the virus disease clinically, but believed to be dietary in origin—a toxic encephalomyelitis. This conception may have to be revised but it appears, at the present time, to be well founded. Climatic conditions that result in widespread production of feed of poor quality are precisely those which favor the multiplication of the insects which are regarded as the transmitters of the infectious type of the disease. Hence, waves of both toxic and infectious forms of encephalitis tend to be superimposed one upon the other.

Some matters concerning the infectious type of encephalomyelitis are not yet generally agreed upon. By many the incidence of the disease in outbreaks is thought to be not over 10% of the horses and mules in the district. Others regard the incidence as being much higher but that only a minority of the animals affected display nervous symptoms. In an experiment in temperature recording, during an outbreak in India, it was noted that a transient pyrexia preceded the nervous symptoms of the disease in all instances. This had been noted previously. However, in the Indian experiment, a larger number of animals presented an identical pyrexia but no other symptoms. This led to the postulation that these latter animals also suffered an attack of the disease but did not develop the nervous symptoms. The view, that the subclinical attacks of the St. Louis type of human encephalitis and of anterior poliomyelitis (also due to a neurotropic virus) are far more common than clinical cases, has a considerable number of adherents in the medical profession.

"Equine" as a part of the name of infectious encephalomyelitis is a misnomer, since a long list of mammals including man, and several species of birds, are susceptible to the disease. A number of them, including man, suffer from natural infection. In fact, as has already been indicated, infectious encephalomyelitis may be, next to the plague and typhus, the most important infection common to both man and animals.

As previously stated two types of the disease occur in the United States—eastern and western. The case mortality among horses in outbreaks of the eastern type is about 90%; in the western type rather less than 25%.

Cases reported to the federal Bureau of Animal Industry numbered approximately 23,000 in 1935; 4,000 in 1936; 176,000 in 1937; 185,000 in 1938; 9,800 in 1939; 17,000 in 1940; and 37,000 in 1941. As yet the eastern type of the disease has occurred only east of the Appalachian Mountains and along the Gulf Coast.[1] The western type has occurred widely in all of the states west of the Appalachian Mountains and in the prairie provinces of Canada.

[1] During September, 1942, approximately 200 cases of encephalomyelitis occurred in Calhoun County, Michigan. At this writing the type of virus has not been determined, but the mortality was 100%, which arouses the suspicion that it may have been the eastern type.

The manner in which the disease is communicated from animal to animal is perhaps not fully understood. Ten species of mosquito, all Aedes, have been shown to be capable of transmitting encephalomyelitis and recently naturally infected mosquitoes (*Culex tarsalis*) have been found. One species of tick also is known to have transmitted the virus to a susceptible animal. However, the epizootiology of the disease and the distribution of the cases strongly indicate that the mosquito is the principal vector. How the virus lives from one season to next and then spreads over thousands of square miles of territory almost simultaneously is as yet unexplained. However, a large number of species of animals and birds have been shown to be capable of constituting a reservoir of the infection. The evidence inclines toward migratory birds as the natural reservoir but positive incrimination is lacking.

Infection with the western virus is more certain by the bite of a mosquito than by injection. Subcutaneous injection of this virus is only occasionally ineffective; but bites of infected mosquito invariably infect, and the symptoms develop more quickly than when infection is by artificial means. It is not known why this should be the case. Possibly some change in the virus may occur in the mosquito to make the infection more virulent; or the accompanying salivary secretion may enhance its growth.

In 1938, there were, as has been stated, 185,000 cases of equine encephalomyelitis among civilian-owned horses. About 40 cases occurred in army animals. Chick vaccine was used on approximately 3,500 military animals that year. In 1939, all army animals, about 35,000 were vaccinated. In 1940 again, some 35,000 were vaccinated, the dose being 10cc subcutaneously, repeated in one week. In 1941, approximately 50,000 were vaccinated, 1cc being given intradermally, and repeated a week later. All army animals are now given two intradermal doses of bivalent vaccine annually. To date the Veterinary Corps of the Army has administered approximately 123,000 double doses of prophylactic treatments of chick tissue vaccine. There have been no cases of encephalomyelitis among army animals that were properly vaccinated.

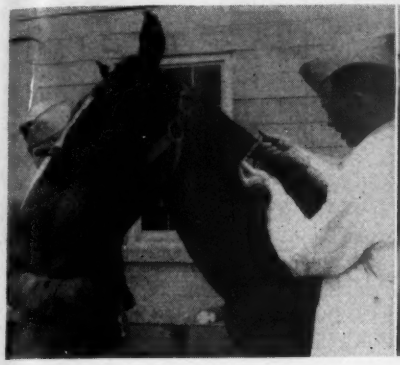
5. *Symptoms.*—The principal symptoms of infectious encephalomyelitis are those of mental derangement, restlessness, and paralysis. The virus type cannot be distinguished clinically from what is regarded as the toxic type of the disease, which is thought to be due to damaged feed.

The onset of the symptoms is sudden. The temperature ranges up to 107° F., the gait is uncertain, the movements aimless. There may be stupor from the beginning, or the case may begin with nervousness and excitement, even delirium, the animal pushing with head or breast into anything it can get against, or walking constantly in a circle, or running into objects blindly. The appetite is in complete abeyance and constipation is marked and stubborn. Partial paralysis of the hind quarters is an early symptom. It soon affects the throat and in most cases progresses until it affects practically all voluntary muscles. It is apt to develop unequally in opposing groups of muscles and cause distortion—such as pulling the muzzle to one side or causing the lower lip to droop. The inability to swallow, even saliva, causes the mouth to give off a foul odor. Paralysis of the muscles of the bladder and rectum is common.

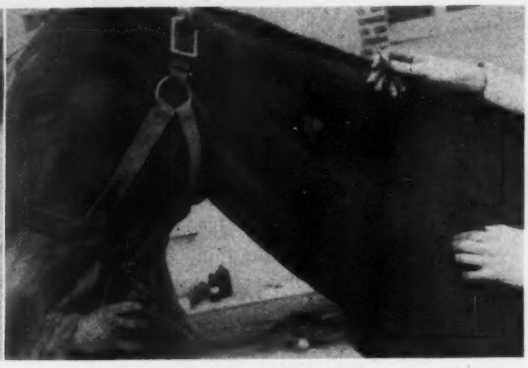
6. *Treatment.*—The treatment of encephalomyelitis is mainly symptomatic. Combat the dehydration, which speedily becomes acute, with intravenous or intraperitoneal saline injections. Water, to which gruel and sugar have been added, may be given *via* the stomach tube, if it does not distress the patient too greatly. Relieve the obstipation and employ general supportive measures. Infected animals should not be worked; their chances of recovery are materially lessened, even by exercise.

Th temperature of all animals should be taken at least twice daily during an outbreak of the disease. Any that show an elevation of temperature above normal should be hospitalized and supported by a well-padded framework as soon as any other symptoms of the disease appear. The mortality has been reduced to less than 10% where this plan has been followed.

Nursing is more important than medication. Do not disturb excitable cases; support in harness, or in a frame, those cases that have difficulty in standing and in every way contribute to the comfort of the animal; provide shade, protection from flies, etc. Since the animals are usually unable to drink, water should be given *via* the stomach tube if the animal is in a suitable condition; otherwise, give copious rectal injections.



Army horses are now vaccinated against both eastern and western strains of infectious encephalomyelitis getting 1cc of each vaccine (mixed), two cc's of vaccine if deposited properly *in* and not under the skin raises a welt of half the size of an English walnut. Up to 1942 army veterinarians had vaccinated 123,500 animals without an unfavorable reaction of the disease in a vaccinated animal



In intradermal vaccination with encephalomyelitis chick vaccine restraint is important. Some animals require more vigorous measures than the one shown in the illustration. The desideratum is to deposit the vaccine into and not under the skin—intradermal not subcutaneous injection. Unless restraint is good, time is lost and the danger of depositing the vaccine subcutaneously is increased

Given early in attacks that are not peracute, antiserum possesses some value. It is probably useless to administer less than 2000cc and the expense makes it impractical, except for horses of unusual value.

7. *Prophylaxis.*—The chick embryo vaccine is remarkably efficacious as a preventive of encephalomyelitis, i.e.. provided the right type of vaccine is used. It is preventive only for the type from which it is made. Western strain vaccine is ineffective against eastern strain virus and vice versa. (The same applies to Borna disease virus and the French type virus.) Two doses should be given intradermally, 7 to 10 days apart.

All army animals in this country are routinely vaccinated against both the eastern and western types of encephalomyelitis but there is a possibility that were they taken with an expeditionary force, they might be exposed to a type of virus against which they had not been immunized. In such cases the following prophylactic measures are recommended:

a. Make liberal use of fly and mosquito repellants.

b. Keep the animals in screened stables at night.

c. Protect the animals in the day time with fly nets or burlap coverings.

d. Permit no grazing; keep the animals stabled when not working.

e. Keep the animals moving when out of the stable; permit no riding in or near brush or tall weeds and grass.

f. Burn damp straw or use smudge pots about watering places and picket lines, if they must be used.

g. Inspect the animals and take temperatures twice daily during an outbreak of the disease in order to detect cases early. Do not work or exercise animals showing an elevation of temperature. Hospitalize them immediately.

h. Keep infected animals in screened, darkened enclosures. Since some species of Aedes will fly as far as 30 miles, isolation is not sufficient.

Equine Infectious Anemia

1. *Synonym.*—Swamp Fever.

2. *Cause.*—A filterable virus.

3. *Geographical Distribution* — World-wide.

4. *General.*—This disease has been discussed in veterinary literature for a hundred years but most of the known facts concerning it have been developed since 1904. During World War I it occasioned extensive losses in all armies in Europe, and still heavier losses among horses belonging to civilian populations on that continent.

Equine infectious anemia has been recognized in the United States since 1911. In this country it has occurred widely, in cycles of considerable prevalence, over the Missouri Valley and southward and in the Mississippi River delta, in contrast to its occurrence in Europe which has usually been in low lying districts or on marshy farms. It is much dreaded by informed livestock owners because of the difficulty of diagnosis, its high mortality and its resistance to treatment.

Only solipeds are susceptible to infectious anemia by natural inoculation. The usual means of its transmission from animal to animal is unknown, but biting insects are strongly suspected. It can be transmitted by ingestion but a relatively large amount of the virus is necessary to infect by this route. Stein and Mott[1] have shown that it may be transmitted from an infected stallion to a susceptible mare through coition but is not spread in the reverse direction, i.e., from an infected mare to the stallion. Its transmission from dam to offspring both *in utero* and during the suckling period occurs but is not common.

The disease may be transmitted by the inoculation of infinitesimal quantities of infectious blood. An amount sufficient to barely stain a hypodermic needle may convey the disease when the needle is used on a susceptible animal. This points to a very real danger to army animals when they are given the mallein test or vaccinated. The blood of an infected horse retains its infectivity for a long period, possibly for the life of the animal.

5. *Symptoms.*—Infectious anemia occurs in acute, chronic and latent forms and in carriers also. The symptoms of the acute and chronic forms bear little resemblance to one another. There are no clinical manifestations of the latent form, until exacerbations occur after which it usually becomes a chronic case. Carriers may be detected only by the spread of the disease to animals associated with them and therefore are usually suspected rather than definitely proved carriers. Laboratory tests are inconclusive in the equine species either for infected animals or for carriers.

Acute Infectious Anemia: In acute attacks the symptoms are essentially those of septicemia. High temperature, usually about 104 sometimes up to 107°F., rapid pulse, hurried respiration, pronounced depression and stubborn disinclination to move, are common manifestations of an acute attack. It is differentiated from respiratory disease by the absence of catarrhal symptoms (although there may be a thin nasal discharge) and a more uncertain and staggery gait. The affected animal tires more easily than from almost any other ailment. The appetite may be in abeyance, impaired or unaffected; rather commonly the latter. The visible mucous membranes are muddy and the conjunctivae may be swollen. The attack lasts 10 to 15 days and is highly fatal (50 to 70%). If apparent recovery takes place, relapses occur when the animal is put back to hard work. The spread is slow. Additional cases in the same stable seldom occurring in a less period than a month although they may occur as early as eight days. Diagnosis is arrived at, in part by exclusion.

Chronic Infectious Anemia: The chronic type of infectious equine anemia is characterized by recurring subacute attacks less severe than those of the acute type with intervals of remission. The temperature ranges from 102 to 103° F. and is often higher in the morning than in the evening.

[1] Stein, C. D., and L. O. Mott, 1942. Studies on congenital transmission of equine infectious anemia. *Vet. Med.* 37:9; pp. 370-377.

This inverted daily temperature curve is of considerable diagnostic value. The recidivations may occur as often as twice monthly or at longer periods up to three, and even eight months. They can be precipitated at any time by hardship and may be postponed by rest, good care and good feeding.

In time the animal becomes progressively weaker and emaciated in spite of a voracious appetite and good feed. It tires easily and, in the later stages of the disease, is unable to work at all. The pulse is quickened and the heart action is pounding. Anemia becomes extreme and the blood requires an hour or longer to clot. On sedimentation the erythrocyte volume is only one-third or even one-fourth that of normal. The red blood cell count falls to two million or even to 1,500,000. The general picture is one of cachexia. Death is the almost invariable outcome.

6. *Lesions.* — The necropsy findings in acute attacks of infectious anemia are not characteristic. They are extremely variable and may resemble those of anthrax or piroplasmosis or almost any acute septicemia. Great enlargement of the liver and spleen is perhaps the most distinguishing macroscopic lesion but it is not always present.

In the chronic type of the disease few lesions are revealed on necropsy other than those of any severe chronic anemia. That anemia is so advanced and severe without other observable cause is, in itself, a diagnostic factor. The fat is usually a deep yellow; the blood thin and slow to clot; the proportion of cells to serum ranges from 1:4 to 1:8; the red bone marrow is increased in amount; the heart enlarged and the walls thin and flabby. There is slight petechiae on the kidneys and to a less extent in other tissues; the liver is light colored. The spleen may or may not be somewhat enlarged; emaciation is extreme.

7. *Treatment.*—No treatment of curative value is known. Army regulations provide that infected animals be destroyed as soon as detected. In civilian practice arsenicals and various other "tonics" are sometimes employed. If the animal survives the acute attack, almost any line of treatment is apparently successful—if it includes good feed and complete rest. But the attack recurs, usually in the chronic form, when the animal goes back to work; perhaps in possession of a new owner.

Photo by E. E. Chamber

Six-year-old mare. Temperature 104°F. Anus relaxed. Weaved when she walked. Hemoglobin 50%. Recovery was apparently complete two weeks later

8. *Prophylaxis.*—Since the means of transmission of equine infectious anemia are not fully known and since no method of immunizing the susceptible animal is available, prevention resolves itself into the avoidance of association of infected and susceptible animals. This makes the problem one of early diagnosis and immediate disposal of infected animals. However, since early diagnosis is extremely difficult in many cases, every means that might inadvertently spread the disease should be avoided routinely. An example of such means is the use of the same needle in mallein testing on two or more horses without thorough disinfection after its use on each animal, or a similar practice when vaccinating the animals of a command against encephalomyelitis, tetanus, anthrax or other infection as previously mentioned. The veterinarian must not forget that minute quantities of the blood of an infected animal may convey the disease to a susceptible one by inoculation. As a precautionary measure it may be well, in the presence of an outbreak, not to change harness, saddle, bridle or halter from one animal to another, as it may be possible to inoculate animals through abrasions made by them.

Infectious Stomatitis

1. *Synonyms.*—Contagious stomatitis, vesicular stomatitis.

2. *Geographical Distribution.* — Worldwide.

3. *Cause.*—A filterable virus or filterable viruses.

4. *General.*—Outbreaks of stomatitis are of frequent occurrence in military animals in time of war, when large numbers are agglomerated.

Catarrhal stomatitis, that due to mechanical injuries, irritant chemicals or acrid forage, seems not to have attracted sufficient attention to have been reported as occurring in military animals. Aphthous or mycotic stomatitis, the type due to molds, and phlegmonous stomatitis may be considered of minor importance to the veterinary officer. Pustular stomatitis (horse pox) is a benign disease, from which spontaneous recovery occurs in about three weeks and, judging from reports, is not common among military animals.

Infectious stomatitis, however, occurs in extensive epizootics—running through all the animals of even large commands within a period of a few weeks and affecting approximately 50% of the horses. There were more than 9,000 horses in the Third Army during the Louisiana maneuvers in 1941. These animals were distributed over hundreds of square miles of terrain with little intercourse between the animals of different organizations, yet as many as 500 new cases of stomatitis occurred daily near the end of the maneuvers. They were not evacuated because of the disease.

The disease is due to a virus of which there appears to be two varieties or types or perhaps the two types of the disease may be due to different viruses. One form, designated vesicular stomatitis, is characterized by fleeting, thin-walled vesicles on the tongue and other oral mucous membranes and some rather mild constitutional symptoms. It was prevalent during World War I, particularly among horses purchased in this country for the French Army. The other form of the disease, the one encountered in the Louisiana army maneuvers in the summer of 1941 differed in that there was an almost entire absence of vesicles; the muzzle, in addition to the oral mucous membranes, was frequently involved and there were no constitutional symptoms.

In both types of the disease the course is rapid and the mortality due to the disease *per se* is nil. The vesicular type, however, results in loss of condition. Both types interfere with use of the animals.

5. *Symptoms.—a. Vesicular type.* The disease is ushered in by slight dullness, impaired appetite and usually some elevation of temperature. As the disease progresses, red areas appear on the tongue, salivation occurs and within a few hours thin-walled, bladder-like vesicles (½ to 2 inches in diameter) form at the site of the inflamed areas. They may extend and coalesce until practically the whole area of the tongue is covered and some may appear on the buccal surface of the mouth and inside the lips. Within 12 to 24 hours the vesicles rupture, leaving superficial, purplish, granulating ulcers which heal spontaneously in 10 days to two weeks. Only the epithelium is raised in the blister or exfoliated. The denuded surface is bluish-red in color, bleeds easily and is very sensitive. There is considerable salivation of a ropy nature often tinged with blood. Eating is painful and the animal refrains from it—hence, the loss of condition. Two types of vesicular stomatitis (Indiana and New Jersey) have been described.

b. Nonvesicular type.—In the other type of infectious stomatitis (the type seen in the Louisiana maneuvers) vesicles are rarely seen. There is no observable constitutional effect produced on the animal, even though the lesions are extensive. There is no elevation of temperature, malaise, nor loss of appetite. There is little salivation, and that only in advanced stages of the disease. The denuded surface is bright-red. In rare cases a single vesicle may be observed. Such vesicles, when they do occur, persist for only an hour or two.

The first abnormality noted is the ab-

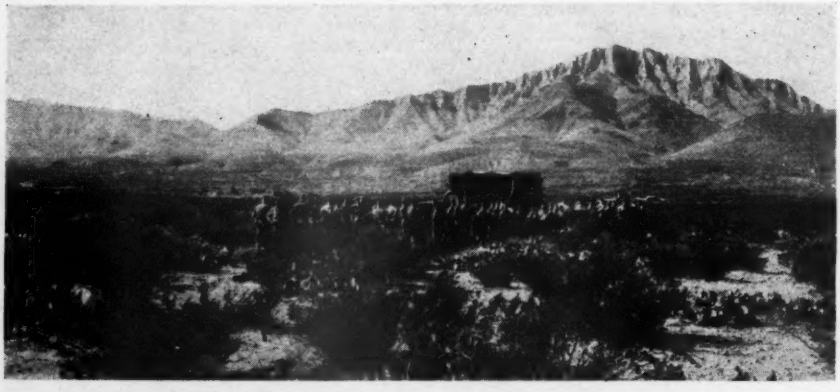
sence of mucous membrane on areas of the tongue. These are usually few in number, and ½ to 1 inch in diameter; the mucosa and sub-mucosa being eroded down to the muscles. There is no evidence of inflammation surrounding the denuded areas. Nevertheless, these areas enlarge rapidly until, in most instances, the entire surface of the tongue is denuded and the muscles may be seen through a transparent, glistening coagulum or adventitious membrane. To a less extent the buccal surface and the inner surfaces of the lips are similarly affected. In about 10% of the cases a few and sometimes many lesions appear on the muzzle. They are most plentiful near the junction of the mucous membrane and the skin but extend to the nostrils and rarely to portions of the mandible covered with hair.

Strangely, even when the tongue is completely denuded of its mucous membrane the animal offers no objection to the handling of it and eats such rough forage as oats and hay readily and but slightly more slowly than normally. Regeneration of the mucous membrane begins four to five days after exfoliation is complete. At first, scattered centers of regeneration may be observed which are barely visible to the naked eye. These increase in number and size till the whole surface is covered. The process requires about three weeks. The whole course of the disease is about 30 to 32 days.

6. *Treatment.*—None of the ordinary mouth lotions or antiseptics exert any influence on the progress of the disease. In a limited number of cases in the outbreak during the Louisiana maneuvers, an aqueous solution of carbol fuchsin, applied to the denuded areas frequently, seemed to slow down their rate of enlargement so that not all of the dorsal surface of the tongue was denuded. The period of healing, however, did not appear to have been shortened. Certainly no treatment tried was worth the trouble of administering it.

7. *Prophylaxis.*—No quarantine, segregation nor isolation of affected or well animals, had any influence on the extension of the type of the disease seen on maneuvers. Many horses, apparently about 50%, appeared to possess a resistance to infectious stomatitis and did not develop it even when fed and watered with the infected animals. Attempts to inoculate animals, not naturally infected during the outbreak, failed completely in a limited number of cases.

Numerous scrapings (collected under the mucous membrane near the margin of denuded areas) uniformly revealed, on microscopic examination, a short chain streptococcus; sometimes in pure or nearly pure culture. The contents of one vesicle gave a pure culture of the same organism. The organism grew readily on artificial media. Repeated efforts to inoculate animals with the culture and produce the disease were unsuccessful. Despite the constant presence of this streptococcus it is not thought to have primary etiological significance.



LUNCH ON THE DESERT—30TH VETERINARY GENERAL HOSPITAL, 1941

African Horse-Sickness

1. *Synonyms.*—Horse pest, perdeziekte.

2. *Geographical Distribution.* — Tropical Africa.

3. *Cause.*—A filterable virus.

4. *General.* — Horse-sickness has been known in Africa for 250 years. It occurs from about 20 degrees North to 35 degrees South Latitude. In low swampy areas it may occur all the year, elsewhere it is unknown during the dry season but begins to appear about three weeks after the rainy season starts. In localities where frost occurs, epizootics end abruptly, eight days after the first frost.

African horse-sickness varies much in prevalence and severity from season to season. In some outbreaks it has attained an incidence of 100% and a mortality rate of 100% over considerable areas, i.e., every horse, mule and ass in the district has succumbed. In an outbreak in 1913-14, 90% of all the horses in Rhodesia died of it. The disease is always destructive to animals newly brought into horse-sickness districts and has wrought disaster to more than one military expedition.

All solipeds, including zebras and zebroids, are susceptible to natural infection by horse-sickness, and to artificial inoculation with minute amounts of infective blood. Dogs acquire the disease by eating carcasses of animals that have died of it; cattle, goats and most laboratory animals are susceptible to artificial inoculation.

Although horse-sickness has been studied by various distinguished investigators including M'Fadyean, Koch, Thieler, duToit and others, the agency responsible for its transmission from animal to animal has not been determined. By circumstantial evidence, it is known to be communicated by night-flying, biting insects, and it has been shown that certain mosquitoes are capable of carrying it, but whether in nature the mosquito is the sole, or even the principal vector, is unknown.

5. *Symptoms.* — Horse-sickness occurs in two forms: (1) An acute pulmonary form in which most of the animals affected die in from an hour to several days and (2) a subacute cardiac form in which the symptoms, similar to those of the acute form develop more slowly and the course may run up to several weeks.

The onset is characterized by a high temperature (104 to 107°F.) with rapid, small pulse and hurried, labored respiration. Edema occurs early or later in the attack; if in the lungs, it may terminate suddenly in death. In the subacute cases edema of the head and neck is pronounced, usually beginning in the orbital fossae which are first filled level with the surrounding tissue and may later be surmounted by swellings of the size of an egg giving the animal a peculiar appearance. The head becomes enormous as the edema increases and gradually extends to the trunk and limbs. When improvement begins the edema first recedes from the head. When edema involves the lungs seriously the animal stretches out on its side and a large amount of white or yellowish, foamy exudate is discharged from the nostrils. Such cases are usually fatal. Animals that recover are subject for several weeks to relapse, if worked.

6. *Lesions.* — Of postmortem lesions Edmonds says:

"Frequently there will be a quantity of white or yellowish-white froth, exuded from the nostrils, lying in front of the nose, coupled with the swellings about the eyes, and in the 'dikkop' (thick head) form of the disease the enlargement of the head and neck presents a typical picture of the animal that has died of horse-sickness. These appearances should not be accepted as absolutely diagnostic of horse-sickness, although they often are. The most constant and reliable lesion is an intense injection of the villous-portion of the stomach. There is nothing like the intense, dark redness and absence of inflammatory signs in any other disease that I have seen, not even in arsenical poisoning. The intestines, large and small, frequently present a similar streaky injected appearance. The next most constant lesion is found in the lungs and heart. The lungs are infiltrated with amber-colored serosity, and on cutting into them this and froth exudes from the cut surfaces. In cases where the froth has not exuded from the nostrils the smaller and larger bronchial tubes will be found filled with it. The heart shows hemorrhage blotchings of a mulberry color; the heart sac contains a quantity, often a large

quantity, of clear fluid, and the chest the same type of fluid in larger amount. The other organs and portions of the body are usually normal in appearance."

7. *Treatment.*—No medicinal treatment has proved of value. Naturally where the most critical involvement is edema of the lungs, all work and exercise must be prohibited and the animal kept as quiet and as comfortable as possible (protected from flies). Edmonds states:

Edmonds

Horse-Sickness, Dikkop (thick head) Type, showing typical nasal effusion—from Edmond's "Diseases of Animals in South Africa"

"The only treatment from which I have seen good results is withholding drinking water whilst the acute symptoms are present, and afterwards allowing it only in very meagre quantities, such as a pint at a time. I have seen animals so treated live several days and show every indication of recovering; but upon giving them a bucket of water they have died within an hour."

8. *Prophylaxis.*—Prevention of horse-sickness consists in protecting the animals from night-flying insects during the season of infectivity. This can be accomplished for farm horses by stabling at night in screened stables; a procedure that is seldom practical for military animals. For the latter certain practices may be instituted that afford a large measure of protection.

1. Do not permit horses or mules to go near swamps or low lying water holes at night at any season.

2. During the rainy season protect animals from insects from an hour before sunset till an hour after sunrise by smoke or fly repellant ointments. Sulphur ointment is said to afford complete protection.

Theiler in 1905 developed a virus-serum inoculation for mules from which the loss was only about 5%. Later he extended its use to horses. The loss in these animals rose to 10%, but even so it proved sound commercially. Unfortunately equine infectious anemia is so prevalent in South Africa that the animals that were treated were often inoculated with the latter disease and the method fell into disuse on that account. Later the simultaneous vaccination somewhat modified was revived by Bevan with better prospects of success.

Blue Tongue
(Malarial Catarrhal Fever)

A filterable virus disease of sheep very similar to horse-sickness in history, incidence, onset and symptoms occur in the same regions. It is, however, less acute and the mortality rate is lower (5 to 50%). Sheep are readily immunized by inoculation with an attenuated virus. Treatment of affected animals is regarded as not only futile but harmful. Sheep which have recovered are immune against further infection, but their blood sometimes remains virulent for 50 days.

Ephemeral Fever

A filterable virus disease of cattle locally known as "three day sickness" occurs widely over Africa. Like horse-sickness and blue tongue it occurs only during the rainy season except in low-lying swampy areas where it may occur at any season. It too, is thought to be transmitted by biting insects. An outbreak of the disease in a herd is spectacular since up to 50% of the animals are attacked simultaneously. Most of them go down and are unable to arise. There is swelling of the joints and great muscular pain. The mortality is almost nil. The animals recover in from two days to two weeks, most of them on the third day of the attack. Treatment is of no avail and should not be attempted. The disease is communicable readily by blood inoculations.

The incubation in such cases is also three days.

Glanders

1. *Synonym.*—Farcy.

2. *Geographical Distribution.*—Asia, Europe, Africa, South America, and to a slight extent North America.

3. *Cause.—Bacillus mallei.*

4. *General.*—In all armies in all ages to the first decade of the present century, glanders was the number one scourge of army animals and only a little less serious in the havoc it wrought among solipeds of the civil population.

Glanders was known and described (by Vegetius) nearly 2,500 years ago. It was recognized as a contagious disease as long as 1,500 years ago. This recognition of its contagiousness enabled horse owners to hold it somewhat in check, except during war, when it invariably wrought havoc among the agglomerated animals of armies and spread from them to the horses of the civil population. About 1750, strict sanitary police regulations for the control of glanders were adopted in France.

Where glanders is prevalent among the horses, rare cases occur in man. There are reports of large numbers of cases having occurred among persons, principally children, of Eastern Europe, following World War I but the reports lack authentication. These human cases of the disease are supposed to have been acquired by eating the flesh of glandered animals. Charles Vial, founder of the London Veterinary College, in 1791, died two years later from this disease. At least one American veterinarian was a victim of it since the turn of the century.

Glanders was a rare disease in the United States until the Civil War. Veterinarians who had the advantage of formal training in veterinary medicine were few in this country at that time and even the few were not employed by the army. As a consequence, glanders ran wild and was soon the cause of enormous loss of army animals. Matters were made still worse by the selling of army horses at public auction when they were unfit for further army use.

The disease was soon present everywhere east of the Mississippi River. Probably no township and certainly no county escaped the infection then or later. Within a decade, after the end of the Civil War, glanders became the No. 1 animal disease problem of the country, causing the farming and transportation industries a staggering loss and requiring 50 years to bring under control.

When the Spanish-American War began in 1898, there was a total of 40 veterinarians with the cavalry and artillery regiments. This number was augmented slightly for the army by a few in national guard organizations and a few who were hired by the Quartermaster. Their status was essentially that of civilians and they lacked the authority or prestige necessary to carry out disease control projects or to initiate disease prevention measures. The glanders situation among army animals was handled only a little better than it was during the Civil War. It was only by resorting to the federal court that the sale of infected animals to the public was prevented. The matter was finally placed in the hands of the Federal Bureau of Animal Industry and thereafter no infected animals were distributed to the public. This placed the mallein test on a solid basis and gave it universal recognition. Glanders was on the way out in this country and a score of years saw it nearing elimination.

The development of the mallein test has made glanders easy of control. Since World War I it has become practically unknown in this country but it still exists in many countries and is practically certain to spread from civilian to military animals when armies occupy such areas. Veterinary officers must be ever on the alert to detect cases at the earliest possible moment by frequent mallein tests of all animals in the command. Despite all that was known about it during World War I the French Army lost 58,000 horses from glanders.

Glanders is primarily a disease of the lungs but has a tendency to localize also in the nasal mucous membrane and in the skin. Involvement is usually chronic and presents no characteristic symptoms until it is far advanced. With good feeding and

proper care a large percentage of cases, where only the lungs are involved, recover. Many such recovered cases remain carriers for life and a menace to any other of the equine species with which they may be associated.

In the horse, glanders is usually a chronic ailment, in the ass it is nearly always acute. The mule occupies an intermediate place in susceptibility. However, both horses and mules subjected to the hardships of a military campaign may suffer principally from the acute form. Infection is mainly by ingestion and the public or common watering trough, hay rack or feed box is the usual source of infection.

5. *Symptoms.*—Clinical symptoms of glanders should not often occur in army animals. If the mallein test is applied at sufficiently short intervals where danger of infection exists, the disease should be detected before clinical symptoms develop. They may, of course, occur in civilian owned animals in the area occupied by the military forces. The symptoms differ with the location of the disease—whether in the lungs, nasal mucous membrane, or skin (farcy).

a. Pulmonary type.—This form, usually termed latent or occult glanders, may exist for months before any clinical symptoms are manifest and when they appear the symptoms are not characteristic—loss of condition, staring coat, asthenic, unproductive cough. As the pathological process continues, blood stained mucous is coughed up. The hide appears to adhere to the ribs (hide bound) and localization in the nasal mucous membranes is prone to ensue with attendant symptoms.

b. Nasal glanders.—This type, like the pulmonary type, may be very chronic and exist for a long period in the upper portions of the Schneiderian membrane where the lesions cannot be seen except on necropsy and the only nasal indications of the presence of the disease may be a slight serous discharge, often intermittent, from one or both nostrils. As the disease process continues, the discharges becomes mucoid in character, and finally purulent, often streaked with blood. It adheres tenaciously to the alae. It may be thrown out in large quantities by coughing and snorting. The inflammatory process extends and finally may reach the external openings of the nostrils.

A disagreeable task of the veterinary officer during World War I was holding necropsies on reactors to the mallein test—*Veterinary Military History*

When visible portions of the nasal mucous membrane are attacked the symptoms in the beginning are indistinguishable from any other nasal catarrh. Later small nodules covered by glistening epithelium develop, break down, and form minute ragged-edged ulcers which coalesce rapidly to form large deep ulcers with abrupt irregular edges. At this stage a persistent nose bleed, when the animal is worked, is a common and almost pathognumonic symptom. Some of the ulcers may heal to form irregular (star shaped) cicatrices.

Any infection of the nasal mucous membrane is accompanied by inflammation of the submaxillary lymph glands. The inflammation of these glands due to glanders is of a peculiar type and highly significant. There is not a tendency for the glands to break down and suppurate, as for example in strangles. Early in the disease they are enlarged, painful and movable but they soon shrink, become very dense and knotty and are attached securely to the surrounding tissue and bone. In this condition the gland is not sensitive to pressure. The

glands on both sides are involved when the nasal infection is bilateral; only on the same side as the infection when it is unilateral. It is commonly bilateral.

c. Cutaneous type (farcy).—This type commonly attacks the lymph glands of the centered on three organs,—the lungs, the nasal mucous membrane and the submaxillary lymph glands. Where there are clinical symptoms of farcy the affected areas should of course, receive particular attention.

In far advanced cases there may be an

All army horses are given a mallein test once annually. In addition they are tested at purchase, before release from quarantine, on change of station and when they may have been among civilian owned animals or have eaten from the same boxes or drunk from the same troughs as these animals. The official mallein test in the army is the intradermal test; the injection being made near the margin of the lower eyelid. When the injection is properly made superficial layers of the delicate skin are raised abruptly as if three-quarters of a small pea had been placed beneath the cuticle. The injection requires excellent restraint to enable the veterinarian to place the mallein into and not under the skin and to avoid unnecessary traumatisms to the structures. Traumatism may lead to swelling and confusion later in reading the test. The method shown in the illustration affords satisfactory restraint on tractable animals. When the injection is made, or sooner if the animal struggles, the ears should be twisted as strongly as may be necessary to keep it quiet. Obstreperous animals can be backed into a single stall or in a corner and in addition a twitch used. The illustration on the right shows an approved method of holding the syringe and making the injection into the hairless skin about one-fourth inch from the margin of the eyelid. The side of the hand is rested firmly against the masseter muscle and can thus follow movements of the head should any occur. The injection is made with a very small caliber needle (24 or 26 gauge) and after a few tests most animals offer little or no objection to the needle. Capt. A. W. Winter, V.C., is shown making the injection

legs, less frequently the sides of the thorax and inferior surface of the abdomen. Nodes of the size of a pea develop in the skin and may terminate in abscesses of the size of a walnut. They are usually quite sensitive. The inflamed glands break down and discharge a viscid yellowish, gray pus through a small opening. The ulcers enlarge and deepen and become indolent. Sometimes the subcutaneous, connective tissue proliferates until the legs attain an enormous size.

d. Necropsy.—Army Regulations require a postmortem examination of the carcasses of all animals destroyed because of a positive reaction to the mallein test. At the necropsy, particular attention should be extensive pneumonia, including ulcers that have caused considerable hemorrhage. In incipient cases, the kind that will ordinarily be seen, the lesions may be few and inconspicuous, consisting of small, scattered nodules, grayish on the outside and yellowish in the center, and surrounded by an inflamed zone. Commonly, in early cases the nodules are of about the size of mustard seed, some of them not more than half that size, and few larger than No. 6 bird shot. In other cases, the majority of the nodules are about one-fourth inch in diameter and otherwise present the same characteristics as the smaller nodules. These nodules are difficult to distinguish macroscopically from

old lesions, the result of previous parasite infestation. The inflammatory zone surrounding the glanders nodule is of differential significance. The irregular densities, resulting from the migration of Ascaris or other larvae should not be mistaken for the glanders lesion, as they are common in the lungs of nearly all horses and should be familiar to all who have performed autopsies on horses.

The appearance of the lesions of farcy and of nasal glanders already has been described. If any lesions are found on the Schneiderian mucous membrane, the submaxillary lymph gland should be examined.

The glanderous lymph gland is dense, irregular on the surface, and firmly adherent to the surrounding tissue. On being incised, numerous cheesy foci are revealed imbedded in dense fibrous tissue, white in color except for a zone immediately surrounding the cheesy foci where it is reddened by the inflammatory process.

6. *Prophylaxis.* — Army Regulations provide that all horses and mules shall be given the mallein test:

a. At the time of purchase.

b. Before being released from the 21day quarantine on arrival at their first station.

c. When they change stations.

d. At least once each year.

e. As frequently as may be deemed advisable in case glanders is detected among animals associated with them.

f. At any time it is suspected they may have been exposed, as when lost or strayed and returned to military control.

The intradermic mallein test is the standard test adopted for use in the army.

Army Regulations (AR 40-2110) gives in minute detail the manner in which a mallein test is given. The direction should be followed carefully.

In case it is doubtful, at the 60th hour, whether a reaction is positive or negative, a retest is made by injecting the lower lid of the other eye in the same manner as the first. At the same time a sample of blood should be drawn for a complement-fixation test.

Before testing, animals should be given a careful physical examination and the following classes excluded from the test.

a. Animals showing clinical symptoms of glanders.

b. Animals in which either eyelid is swollen.

c. Animals affected with purpura hemorrhagica.

d. Animals experiencing an acute attack of periodic ophthalmia or conjunctivitis or having a discharge from either eye.

Proper restraint at the time of making the injection is important—to prevent accidental traumatic injuries to the eyelid, which sometimes lead to doubt in interpreting the reaction.

The intradermic mallein test is a remarkably dependable one. However, great care should be exercised in its interpretation as an animal that has been purchased by the army, transported, trained and issued to troops, represents a very considerable investment and its replacement may be difficult. Many mistakes were made in the interpretation of the opthalmic mallein test during World War I.

Edema of the eyelid, epiphora, or even copious mucous discharge from the eye, 24 to 36 hours after the intrapalprebrel injection of mallein does not, if it clears up promptly, constitute a positive reaction to the mallein test or indicate infection. A positive reaction is indicated by a marked swelling, usually of both eyelids and frequently extending down the face, often a mucopurulent discharge, and photophobia present 72 hours or longer after the injection of mallein. Commonly, the positive reaction to mallein will show general malaise, lack of appetite, a pained expression and often some rise in temperature. The eye is very sensitive and the animal jerks its head if one attempts to touch it.

If the eye is clear and the edema has disappeared at the 48th hour after the injection, the interpretation of the test as negative is justified. Reactions that have not disappeared at the 48th hour should be held under observation 24 to 48 hours longer. A decision that the reaction is positive is not justified sooner than 72 hours.

U. S. Army Regulations provide that animals reacting positively to the mallein test or diagnosed as glanderous upon clinical examination shall be destroyed immediately.

Anthrax

1. *Synonyms.*—Charbon. In man: wool sorters' disease and malignant pustule (carbuncle).

2. *Geographical Distribution.* — World-wide.

3. *Cause.—Bacillus anthracis.*

4. *General.*—Anthrax is not a disease of great military importance because, where good livestock sanitary practices prevail, the loss from it is rarely considerable. On the other hand it is a serious disease because of its wide distribution; the fact that it is not possible to entirely prevent it by sanitary measures and because of the hazard it constitutes to military personnel.

Anthrax is one of the ancient scourges. It is described in the early writings on animal disease. The fifth plague of Egypt, described in the Bible, was undoubtedly anthrax. The anthrax bacillus was the first microorganism to be described as a specific cause of a disease and anthrax was the first disease against which animals were artificially immunized. This was accomplished by Louis Pasteur in 1881 and established the foundation upon which subsequent immunological measures were founded.

Anthrax occurs to a greater or less extent in practically all countries. It is prevalent throughout India and the Middle East, in which sections livestock sanitary regulations, as we know them, are non-existent and carcasses are allowed to decay where the animal dies or are thrown into rivers. This results in practically all low land areas being contaminated with anthrax spores and animals grazing upon such land or camping upon it are exposed to infection. Anthrax is prevalent in Manchuria, where the army in the Philippines formerly purchased much of its beef.

The harmlessness and effectiveness of vaccination are so well established that it is unlikely military animals will be taken on foreign service without being immunized against anthrax. The problem of the veterinary officer will be that of protecting the military personnel from the use of the flesh of infected animals.

Anthrax is a disease that could be easily spread should the enemy resort to biological warfare. The organism can be produced readily in any quantity. The spores retain their infectivity for any required period of time and offer no difficulty of transport and delivery, either by air or by terrestrial agents.

5. *Symptoms.*—In solipeds symptoms are usually characterized by large subcutaneous swellings in the region of the sternum, beneath the abdomen and in the sheath; less frequently on the neck and throat. The temperature is elevated and the depression marked. The animals live from 12 to 72 hours after symptoms appear and about 5% recover naturally. The decomposition of carcasses of animals dead of anthrax is very rapid.

In cattle the disease is extremely acute and evidences, other than sudden death and rapid decomposition of the carcass, are seldom seen. In sheep the disease is even more acute than in cattle. They often drop dead while grazing, as suddenly as though shot. In swine practically the only symptom is a diphtheritic inflammation of the tonsils and pharynx and swelling of the lymph glands and surrounding tissues of the throat. This swelling may become so extensive as to suffocate the animal after three or four days but more often it disappears after three weeks and the animal recovers. Dogs are less susceptible than swine but are sometimes infected from eating the carcasses of animals dead of the disease. The symptoms are not characteristic but resemble those in swine.

6. *Lesions.*—Diagnosis of anthrax ordinarily will have to be made postmortem. Characteristic signs are oozing of dark non-clotting blood from the nostrils, mouth and anus, extreme bloating of the carcass shortly after death and rapid decomposition. The carcass should not be opened if there is reasonable certainty that the disease is anthrax. However, if it is opened, the spleen will be found to be greatly enlarged and the pulp and blood within it to resemble tar. Sometimes a diagnosis without

The zebu is widely domesticated in India—the home of anthrax, East Africa and in parts of South America. It is used chiefly as a draught animal

opening the abdomen can be made from the appearance of the subcutaneous abdominal veins. On laying back the skin, if these veins contain solidly clotted blood it is almost conclusive evidence that the disease is not anthrax. If, on the contrary, they are engorged with unclotted blood, black in color, it is strongly indicative of anthrax.

Diagnosis is confirmed by finding the anthrax organism in the blood on microscopic examination or by inoculation. It should be remembered that the bacilli occur in the blood, in large numbers, only immediately before death and for a short period afterward.

7. *Treatment.*—There is no known treatment for anthrax that possesses any value in cattle and sheep. In carnivora, antiserum is probably of value; in horses it is frequently disappointing. In man, the use of the serum constitutes a highly specific treatment.

8. *Prophylaxis.*—Animals acquire anthrax principally by ingesting the organism or from the bites of flies, chiefly the tabanids that have fed upon infected animals.

Infection by ingestion is acquired readily by grazing on infected pastures and overflowed lands. The lush grass, growing where an infected carcass has decomposed the preceding season, is particularly dangerous.

In the Middle East and in India, the custom of using animals to trample the grain from the straw is common and such grain is usually heavily contaminated with anthrax spores. Hay grown on infected areas is often contaminated with the spores and may be a source of infection to animals consuming it. Both grain and hay may be rendered reasonably safe by washing it, since mass ingestion of spores is usually required to produce the disease.

In districts where anthrax is common, military camps should not be made on overflowed land or land into which pastures drain. Dogs, and particularly jackals, should be prevented from carrying infection from carcasses into the camp.

Animals may be protected from tabanids and some other biting flies by keeping them away from brush and tall weeds.

The prompt and proper disposal of the carcasses of animals dead of anthrax is the most important means of preventing its extension. Carcasses should be burned or buried where they lie or, if this be impracticable—after plugging the natural openings, they should be moved to the place of disposal with necessary precautions to prevent contamination of additional areas. Oil should be poured over the area where a carcass has lain and burned.

Anthrax-vaccine should be employed for the protection of army animals, and under some circumstances for the protection of animals the army intends to use for food.

Army Regulations provide that all cases of anthrax in army animals shall be destroyed as soon as diagnosed.

Ulcerative Cellulitis

1. *Synonyms.* — Ulcerative lymphangitis, pseudo-farcy, pseudo-glanders, Preisz-Nocard disease.

2. *Geographical Distribution.* — France, Belgium, and the Philippine Islands.

3. *Cause.—Corynebacterium ovis* (Preisz-Nocard bacillus) and secondary infection with staphlococci, streptococci, and other organisms.

4. *General.*—This disease stood high on the list of those causing the greatest amount of incapacity of animals in the American Expeditionary Force in France. The British veterinary service ranked it third in causes of disabilities on the same front.

The Priesz-Nocard bacillus, which causes also caseous lymphadenitis in sheep, is generally regarded as the specific cause of this disease although this is doubted by numerous investigators. It is usually in the minority among organisms found in the lesions. Sometimes it cannot be found at all. Apparently it secretes a toxin that is responsible for the systemic effect of the disease. It is a saprophyte in nature and infection occurs through breaks in the integument, usually below the hock or knee, calk wounds, heel cracks, rope burns, etc. Ulcerative cellulitis is sometimes indistinguishable clinically from farcy. During the Philippine War (1902), it was so often diagnosed clinically as glanders that the mallein test became locally discredited.

During World War I both the American and the British veterinary service instituted research into the nature of this disease (Leibold, Watson). Each project developed a vaccine that was thought helpful but the end of the war and discontinuance of the projects came before anything of a positive value in either the prevention or the treatment of the disease was developed. It remains a serious plague of military animals in western Europe. In the Philippine Islands, where reports indicate that it was formerly common, the incidence of ulcerative lymphangitis among military animals has been low for many years, and of recent years practically nil. The possibility remains that under favorable conditions it may flare up almost anywhere since the Priesz-Nocard organism is widely distributed. Like a number of other pathogenic organisms, this one is prone to assume a virulence among military animals subjected to the close associations and hardships of a campaign of which it is never suspected from its relative innocuousness in the halcyon days of peace.

5. *Symptoms.*—The onset of the disease is characterized by sudden, hot, painful swelling, usually in the region of the metatarsus or metacarpus; in most instances accompanied by lameness, commonly extremely severe. The earliest diagnostic symptom is the appearance of small nodules of about the size of a pea or somewhat larger. Within a few hours these nodules break and discharge a sanguinous, thin pus. The suppuration extends rapidly into the inflamed cutaneous and subcutaneous tissues and, within two to four days, considerable sloughing takes place, leaving ulcers of varying sizes which continue to discharge serum and pus sometimes streaked with blood.

In some cases the nodular swelling and suppuration is less diffuse, and follows the chain of lymphatics, the vein becoming enlarged and palpable as a cord-like structure extending up the leg—similar to lesions of farcy and epizootic lymphangitis.

6. *Treatment.*—The treatment of ulcerative cellulitis is unsatisfactory. Serious cases with large sloughs are incurable and less serious cases, where healing of the ulcers is attained, frequently relapse — new ulcers suddenly appearing at the site of the healed lesions. This may occur in a few days to several weeks. In the British veterinary service in the World War I, the following classes of cases were considered non-treatable:

a. Showing ulcers above the hock or knee.

b. Showing more than two small ulcers below the hock or knee.

c. Showing a large extended (two or more ulcers coalesced) ulcer below the hock or knee.

Experience in France had convinced British veterinary officers that animals having such lesions should be destroyed at once.

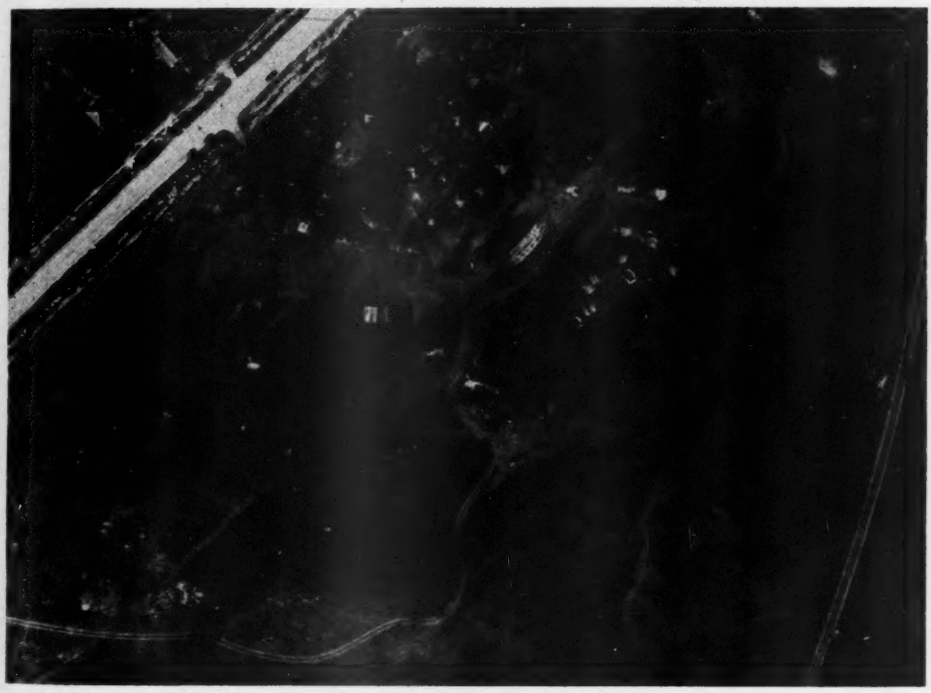
In less severe cases, treatment consisted

of clipping the affected part, cleaning it thoroughly with soap and water, removing the necrotic tissue surgically, and painting the ulcer with tincture of iodine. The leg was then bandaged in an antiseptic pack. A solution of copper sulphate (1%) gave the best results. Rest, good feed and proper hygiene contribute to a favorable outcome.

There have been no reports of the use of the sulfa compounds in ulcerative cellulitis but from the results of its use in other suppurative conditions it would seem logical to give it a trial in this one. Clipping and cleaning the leg, packing the ulcer with powdered sulfanilamide and administering the drug internally (one grain per pound of body weight daily) might possibly give good results. The daily portion of sulfanilamide should be given in three doses and continued four days; then half this amount should be given for an additional four days.

Vaccine therapy, pyotherapy and serum therapy (use of diphtheria antitoxin) all have been recommended for both the treatment and the prevention of this disease. They have not received general recognition as being of any value.

7. *Prophylaxis.*—Nothing is known that is more effective in preventing ulcerative lymphangitis than to keep the legs clean, promptly treat all wounds and abrasions, however trivial, below the hocks and knees and to keep the amount of infection in the stables and corrals at a minimum by the early recognition and immediate segregation of all cases of the disease.



This airplane view of the 30th Veterinary General Hospital at DeQuincy, La., during the 1941 Army maneuvers, illustrates one type of camouflage. Instructions were that the type of installation should be concealed, but not necessarily the installation itself. There were approximately 600 horses in the hospital when the photograph was taken yet none of them are revealed in the photograph. It would have been very easy to camouflage the tents so that none of them could have been seen from the air (most of them are invisible in the photo) but concealing the roads from aerial observation would have offered considerable difficulty with the materials at hand. The highway (upper right hand corner) is State No. 7. In the lower right corner railroad tracks may be seen

Epizootic Lymphangitis

1. *Synonyms.* — African glanders, Japanese glanders, pseudo-glanders.

2. *Geographical Distribution.*—Continental Europe, Africa, Asia, Oceania.

3. *Cause.*—Probably *Saccharomyces farciminosus* (*Blastomyces farciminosus, Cryptococcus farciminosus*).

4. *General.*—In districts where it is indigenous, epizootic lymphangitis is probably one of the most difficult of all infections from which to protect military animals. Infection occurs through abrasions and wounds, which require careful protection to avoid contamination. In World War I, the British army veterinary service followed the plan of dressing all wounds with an antiseptic and a protective covering from the time they were discovered, and of destroying all animals infected with the disease as soon as a diagnosis of epizootic lymphangitis was made. They were able to hold their lymphangitis cases to small numbers in areas where the French forces had thousands of cases. Formerly this disease was thought to be confined to the warmer climates but of recent years it has been recognized in Finland and in northern parts of Russia. Exceptionally, it affects cattle.

5. *Symptoms and Lesions.* — Epizootic lymphangitis is an extremely chronic disease. The incubative period is six to eight weeks and the course two to four months or longer. The first symptom noted is nodules on the lymph vessels draining from the site (a wound or abrasion) of inoculation. As the disease progresses the nodules suppurate and the lymph glands, into which they drain, swell and often develop large abscesses. Lesions may occur on the nasal mucosa. Clinically, the disease is differentiated from farcy with difficulty. In other respects the symptoms and lesions resemble pustular dermatitis, phlegmon and ulcerative lymphangitis.

Diagnosis is confirmed by finding the fungus in smears from the pus. Farcy, of course, may be excluded by the mallein test.

6. *Treatment.*—The British experience in World War I, chiefly in France and in the Balkan Peninsula, indicates that, ordinarily, treatment of infected military animals is inadvisable. Cases were believed to present a hazard to other animals too great to justify retention of the affected animal in a hospital.

The experience of both American army veterinarians and civilian veterinarians in the Philippines where epizootic lymphangitis is common is at variance with that of the British in Europe. In the Philippines contact infection occurring in a hospital has been rare and only cases with extensive involvement are sacrificed. All others are treated. With proper treatment instituted at the outset of the disease 75 to 85% of the cases of epizootic lymphangitis recover. Essentially, treatment consists of surgical removal of the affected tissues and cauterization of the surgical wound. Cauterization may have to be repeated.

This American experience may not be duplicated under wartime conditions, but the method deserves a trial since if successful it will conserve animal strength.

7. *Prophylaxis.*—Prevention consists mainly in limiting the source of infection—animals suffering from the disease. In the Balkan campaign during World War I, the British veterinary service followed the plan of applying to all wounds a dressing composed of turpentine 5 parts, cresol 5 parts, petrol 10 parts and neutral oil to make 100 parts. Cotton saturated with this preparation was bound on the wound before evacuation and remained until removed at the veterinary hospital. The wounds reached the hospital clean and in good condition. To this practice and that of destroying cases as soon as detected, British veterinary officers attributed the remarkable freedom of British horses from the disease. Only a negligible number of cases of lymphangitis occurred during the whole campaign in the Balkans. A nearby French veterinary hospital contained 600 cases at one time.

Some degree of success in the prevention of epizootic lymphangitis has been reported from the employment of vaccine therapy, pyotherapy and serum therapy. Their usefulness, however, is by no means established.

Dermatitis Gangrenosa

1. *Synonyms.*—Necrotic dermatitis, gangrenous dermatitis.

2. *Geographical Distribution.*—Probably everywhere.

3. *Cause.—Actinomyces necrophorus.*

4. *General.*—This rather obscure ailment may be responsible for much loss among animals compelled to stand in mud and filth, particularly in cold weather. When animals can be given dry standings, it occasions no difficulty. While the cause is generally attributed to the necrophorus bacillus, as in other infections of that organism it may not be the primary cause but a secondary invasion, following injury to the tissue, by toxins of other organisms, freezing or maceration by mud and water, particularly in cold weather.

5. *Symptoms.*—The first symptom noted is usually extreme lameness. On examination of the extremity, areas of various size, from ½ to 2 inches in diameter, are found about the pastern or on the heels where the skin is inflamed, firmer than normal and sensitive to pressure. The area often includes a slight abrasion or deeper wound which may have afforded the necrophorus organism entry.

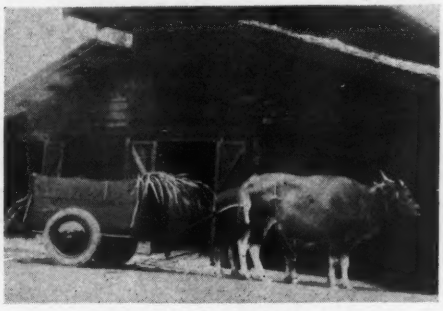
The affected tissue soon feels leathery to the touch and in time separates from the surrounding tissue. The necrosis extends more or less deeply into subadjacent tissues and ultimately a section sloughs out. The necrotic tissue may extend to the bone. Open joints often result from such sloughing and the hoof may be shed. The lesion presents the characteristic foul odor of necrophorus infection. Recovery is the rule unless metastasis occurs, however the animal may be of little use thereafter.

Until the eschar separates from the healthy tissue there may be considerable fever and other constitutional disturbance, all of which vanish quickly when the diseased tissue is detached leaving a healthy granulating surface.

In severe cases the toxemia may be more marked, and even death may occur. This latter eventuality is usually a result of metastatic foci of necrophorus organisms developing in the lungs or elsewhere.

Quittor is a common sequel to gangrenous dermatitis as is also periosteitis and, as already mentioned, arthritis. Where there is extensive destruction of tissue, deformity may result even though the healing progresses favorably.

6. *Treatment.*—Nothing but the natural resistance of the tissues seems to have much effect in stopping the process of necrosis. The treatment most used has been the bichloride of mercury (1 to 500) pack. Better



MALAYAN TRANSPORT

results seem to have followed the employment of packs of saturated solution of Epsom salt.

7. *Prophylaxis.*—All that is needed to prevent the development of necrotic dermatitis is good sanitation. It does not develop in animals on dry standings. If such cannot be provided, removal to "clean" mud slows up the extension of the infection.

Animals required to work in mud or filth should be groomed twice daily, special attention being given to the feet and fetlocks. All wounds, however slight, of these parts, should be treated promptly and the animals given dry standings when not at work. The fetlocks should not be trimmed in cool or cold weather. After washing mud from the legs they should be dried immediately by friction.

Corrals are objectionable under any circumstances and particularly so in the presence of this disease. If they must be used not more than 50 well animals should be confined in any one enclosure.

Respiratory Diseases

In all past wars respiratory diseases have taken a terrible toll of army animals. In his work "Animal Heroes of the Great War," Earnest Baynes said of American experience during World War I:

"In the handling of public animals during the war, the haste of the emergency and our own inexperience made it impossible to observe well known principles of animal hygiene. Consequently, morbidity and mortality ran high. Buying and shipping were active. Railroads were congested, shipments suffered delays of days and weeks and the federal law which requires that all animals be unloaded for food, water and rest once in each 28 hours was not enforced. . . . Stockyards and cars were infected with influenza, strangles, etc. . . . —Some animals were sick when unloaded, others became sick in transit and many arrived dead or incurably sick. Unfortunately, animals left the cars for conditions as bad as, or sometimes worse than, those in transit. Most of the remount depots were overcrowded and decidedly insanitary. Many were located on low land with clay subsoil and the corrals became seas of mud."

"Veterinary Military History of the United States" says of the same conditions:

"The morbidity from virulent respiratory infections became appalling during the winter of 1917-18, in the United States, as well as in France, owing to agglomerating thousands of 'green' animals where no provisions for the sanitary handling of them had been provided. Everywhere at home and abroad, public animals were exposed to inclement weather, mud-puddled ground, filthy watering troughs, and accumulated droppings. . . . Lack of understanding and not of means nor money was the obstacle."

And again:

"The execrable insanitary conditions baffle any attempt to portray them in mere words. Filth, stench, diseases, exhaustion, exposure and general despair overwhelmed both animals and personnel, and the loss from disability and death not only made incomputable inroads upon the national wealth and available supply of animals but also seriously hampered the operations of the combat troops."

Writing of conditions at auxiliary remount stations the Surgeon General of the Army, in his annual report for 1919, said:

"The ever-present picture of large herds of animals running loose in corrals, extensive areas of which, were knee deep in mud and manure, did not change until the animals died or were disposed of. . . . There was no avoiding these insanitary conditions based as they were on an inherently incorrect principle. The corral for general use in the United States is a failure and should not be tolerated in the future."

The diseases referred to in the foregoing were the common communicable respiratory diseases of horses. Mainly strangles, influenza and infectious pleuropneumonia.

These quotations show that such diseases may become a scourge of the first magnitude in army animals.'

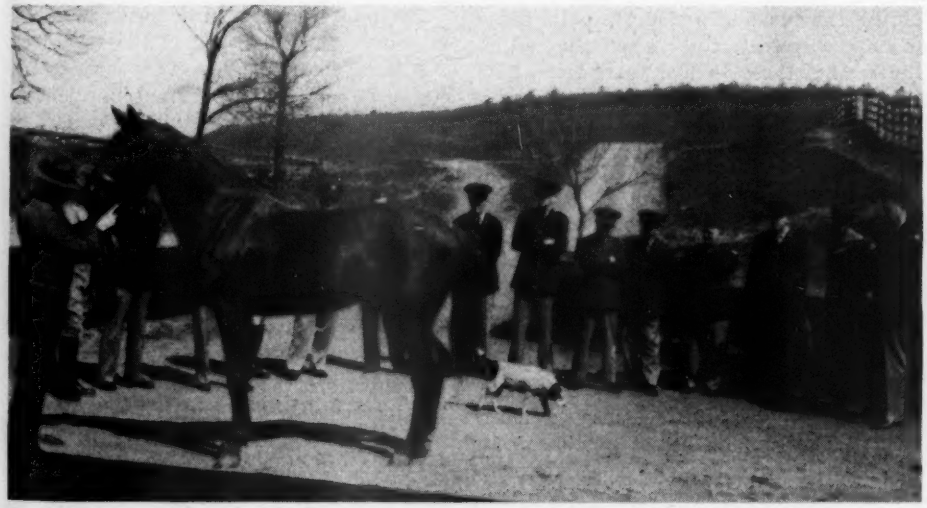
12TH CAVALRY MOUNTS, FORT BROWN, TEXAS

Southernmost Army Post in Continental United States. Lieut. Gen. Jonathan M. Wainright (then a brigadier general) was in command of the brigade to which the 12th Cavalry belonged at the time photograph was taken (Feb. 1939)

Except at long intervals the loss among civilian-owned horses from respiratory diseases has not been large. The loss of seasoned army animals from these diseases is practically nil during peace time. There is some loss among animals newly acquired by the army even in normal times but it is not serious. It is the violation of every law of hygiene and sanitation, the abuse of animals by train journeys of 40 to 60 hours without feed, water or rest; exposure to mass infection and inclement weather in overcrowded filthy corrals and the agglomeration of vast numbers of unacclimatized animals that convert respiratory diseases of horses and mules into a catastrophe for the army and the nation. Under such conditions the loss is appalling not only among newly-purchased animals but also among debilitated, seasoned animals, as a result of mass infection carried to them by the infected remounts.

The respiratory diseases of importance to army animals other than glanders which is discussed elsewhere are: strangles, influenza, infectious bronchitis, pneumonia, and purpura. The latter is not communicable in the usual acceptance of the term but infections with which it is commonly associated are communicable, hence, it is discussed with communicable diseases. Some pneumonias are not regarded as being infectious but the type most common among military animals is communicable.

That "shipping diseases" or "shipping fever" are not inseparable from the rail transportation of army animals is shown by the experiences of the 1st Cavalry Division and the 55th Cavalry Brigade in the summer of 1941. These organizations shipped all their animals, some 9000 horses and mules from Fort Bliss, Texas, to the maneuvers in Louisiana, a distance of 1000 miles and not a single case of strangles nor influenza and only one case of pneumonia developed as a result of the movement. They were seasoned animals and were under veterinary supervision at all times during the loading, the rail journey and the unloading, both enroute and at destination. That is the way to move masses of animals to other than slaughter. The public and too often transportation officers do not realize this. They see millions of animals transported to market with minimum loss from disease. They do not realize that the celerity with which the slaughter pen replaces the railroad car or truck prevents the development of an incalculable amount of disease.



Col. Jack Fuller (extreme right) and veterinary officers from Medical Field Service School, Carlisle Barracks, Pa., visit Front Royal Remount Depot, Front Royal, Va.

Strangles

1. *Synonyms.*—Colt distemper, infectious adenitis.

2. *Geographical Distribution.* — World-wide.

3. *Cause.*—*Streptococcus equi* and possibly a virus.

4. *General.*—In annual reports of the Surgeon General of the Army, strangles stands high among the causes of veterinary hospitalization. In the year ending June 30, 1941, it was first among infectious and parasitic diseases in the number of admissions accounted for and was responsible for a greater number of admissions to the register of sick and wounded than all non-infectious respiratory diseases combined.

That the *streptococcus equi* is the specific cause of strangles is accepted by most authorities but others doubt that such is the case. Some characteristics of the disease indicate the primary cause may be a virus and that the streptococcus is merely the most important of the secondary invaders.

An attack of strangles confers a fairly high degree of immunity that lasts for a number of years. Other things being equal the younger the animal the more severe the attack, and the shorter the period of immunity. Thus foals that suffer an attack during the suckling period are quite likely to have a second attack when they go on the market three to five years later. Like the immunity to a number of other diseases, the resistance to strangles can be overcome by hardship, exposure, exhaustion and debility. The amount of infection too plays an important role in breaking down resistance.

During the fiscal year referred to above, the army purchased 18,545 animals and the veterinary service reported 1,688 cases of strangles. Even if all cases occurred in newly purchased animals, the incidence was only 9%. This probably represents about the minimum at which the disease can be held. During World War I the incidence was many times higher among horses purchased for the American and French armies and considerably higher among Italian and British purchases. There is a possibility that some of the 850 cases reported as rhinitis may have been mild attacks of strangles but even if half of such cases were strangles, and that is scarcely probable, the incidence among newly purchased horses last year was still extremely low. This is to be attributed, in the main, to the care with which the animals were selected at purchase and to the good management and good sanitation that obtained during shipment. The incubation period of strangles is four to ten days. Sometimes many cases will occur within 24 hours after a group of highly susceptible animals are exposed to conditions favorable to the disease—such as severe chilling after a fast ride or standing in a cold rain. The explanation of this sudden onset is not clear. It is an exceptional occurrence.

Symptoms.—Mild attacks of strangles may amount to little more than a nasal catarrh. The elevation of temperature is transient, the appetite unimpaired and the sub-maxillary glands little affected. These mild cases recover spontaneously if protected from chilling and otherwise given good nursing. When occurring singly, such cases cannot be distinguished from simple catarrh. It is only by more severe cases occurring in the same group of animals at the same time, that they are recognized as strangles.

The typical case of strangles is more severe than that discribed in the foregoing. The nasal catarrh runs rapidly through the stages of serous, mucous, mucopurulent to purulent. There is a conjunctivitis more or less severe and a pharyngitis. The submaxillary lymph glands instead of being slightly enlarged, as is commonly the case in simple catarrh, are much enlarged, hot and painful and soon suppurate. The temperature is high, until the abscesses are evacuated, the appetite in abeyance and, because of the pharyngitis, water returns through the nose when the animal drinks. There is an annoying, unproductive cough. Even in these cases the mortality is low and recovery prompt after evacuation of the abscesses if the animal be cared for well.

Strangles is prone to grave and even fatal complications from rather trivial causes—exposure to a cold wind, an hour in a chilly

rain, confinement in an unventilated stable where the humidity runs high, a few hours at hard work or a rail journey. Any of these factors may result in laryngitis with perhaps edema and death; bronchopneumonia with prolonged convalescence or fatal termination; inflammation of the gutteral pouches, parotitis, suppuration of lymph glands in various parts of the body and even generalized septicemia. All of these complications are serious and the mortality, in cases so complicated, is high, and even though the animal survive it is likely to suffer impairment of its usefulness.

An animal that develops strangles during or soon after a rail journey or an animal that has recently passed through a public stockyard or sales stable is quite likely to develop influenza also. Such cases usually are severe to grave. The symptoms of both diseases are superimposed one upon the other and in addition the cutaneous lymph glands about the head and throat may also become infected, swell enormously and eventually suppurate. Such an animal presents the appearance of purpura of the head, face and neck. However, the swelling is differentiated from that of purpura by being hot and painful.

Differentiating strangles and influenza by the clinical symptoms alone is often difficult, particularly so when they coexist. Some are prone to call the disease strangles if it occurs in young animals, but if the mature become affected to designate it influenza. Age in this instance is not an infallible criterion. Strangles spreads readily among animals of any age if they are maintained under grossly insanitary conditions, overcrowded or severely debilitated, and where the infection is ingested in large quantities; as in drinking water highly contaminated with nasal discharge of infected animals.

Treatment.—All general infections, from which recovery is hoped, require supportive and symptomatic treatment. Even when no specific treatment is known, treatment—nursing and medication—that alleviates the distress of the patient, contributes to its strength in the battle with the infection and promotes and hastens recovery, is demanded. In perhaps no other infection is the reward of good nursing so evident as in cases of strangles in young animals.

In all but the mildest type of strangles the afflicted animal presents a picture of

View of the Veterinary Hospital Area at Front Royal, Virginia

misery and agony. The temperature is high, the breathing labored, the head extended to relieve the painful swelling of the throat, the nostrils are nearly plugged with mucous and pus, the eyes hurt, the swollen lymphatic glands are so many centers of throbbing pain, the pressure on the delicate membranes of the nasal chamber causes acute distress; swallowing, even water, causes excruciating pangs in the pharynx, in the larynx and wherever the esophagus impinges upon the trachea. A racking, dry cough adds to distress, discomfort and pain.

Much can be done to alleviate this acute suffering. The animal should be kept warmly blanketed, if necessary, and the legs bandaged to support the circulation. It should be groomed thoroughly at least twice daily. It should be turned into a corral on warm sunny days but always stabled at night and on cold or rainy days. The stable should be warm and it must be well ventilated. Hot or humid buildings aggravate all distress. The pus should be cleaned from the nostrils and the surfaces coated with petrolatum frequently. Clean water should be available always, where the head will not need to be lowered much to drink it. The animal should be offered soft, fresh, clean food often as, even when the animal is unable to swallow, attempting to eat will improve the condition of the mouth, which is usually foul.

Of the symptomatic medication nothing else probably gives so much immediate relief as irrigation of the nasal chamber. A

warm solution containing one dram each of sodium chloride and sodium bicarbonate to a quart of water is recommended. Irrigation may be accomplished by means of a fountain syringe and the use of a soft rubber catheter with many side holes cut in the distal four inches. This should be passed as far into the nasal cavity as possible, and copious quantities of water used. The nasal chamber should be irrigated frequently. After the discharge becomes mucopurulent or purulent, the washing may be followed with advantage by lavage with a 1% alum solution. This astringent decreases the congestion in the Schneiderian membrane and lessens the discharge.

The eyes too should receive attention. Keep the discharge cleaned away and instill a saturated solution of boric acid or 5% solution of sodium bicarbonate into the conjunctival sacs frequently.

Abscesses should be drained as soon as it is certain the swollen glands contain pus. A fall in temperature and marked general improvements occurs immediately the pus is evacuated. As good results are obtained from evacuating a spoonful of pus from a gland (when that is all there is in it) as from waiting until the abscess "points" and then evacuating, perhaps a half-pint of pus. Recovery is hastened, complications possibly prevented and destruction of tissue lessened by the earlier operation.

In general infections, where there is a high temperature and an acute toxemia for a considerable period, the heart suffers from malnutrition and over-work. Two agents, digitalis, and dextrose intravenously, stand out as corrective and supportive measures to conserve the strength of the heart under such conditions. Foreseeing the possible development of pneumonia as a complication, these agents should be used early in grave cases of strangles.

Seymour and Stevenson[1] used strangles antiserum (prepared by the Army Veterinary Laboratory of the Eighth Service Command) in a long series of cases of strangles, with gratifying results. They administered it intravenously in doses of 100 to 200cc daily until marked improvement set in, then every second day for a few days and later at longer intervals. Frequently an equal quantity of normal saline solution or one half the quantity of 50% glucose solution was added to the serum injection. In cases showing marked symptoms of septicemia, 60 to 90gm of sulfanilamide was administered *per os* daily for four days.

The use of blood plasma in the treatment of strangles appears not to have been reported. Reasoning from its extensive use in man and its very limited use in horses in acute infections, it seems probable that it would be as effective as convalescent serum and possess several advantages over the serum. A trial of it, particularly of dried plasma instead of the serum, is suggested.

The use of sulfanilamide in the treatment of strangles seems not to have been reported, except in the very restricted way mentioned in the foregoing, and by Bazeley (*Vet. Rec.* 53:50 pp. 730-33) who found it unsatisfactory. Because of its remarkable efficacy in other streptococcic infections, it merits a trial as the principal medicament in this disease. Judging from its use in other infections in the horse, the dose should be 1 to 1½ grains daily per pound of body weight. This quantity should be divided into three doses and administered at 8-hour intervals, continued for four days, then half the quantity should be given for an additional four days.

Always, in severe cases of strangles, there is danger of suffocation, either from edema of the larynx, or closing of the trachea from the pressure of a swollen lymph gland or an abscess. Intubation should be performed at the first sign of suffocation.

Prophylaxis.—There is no biological product of unquestioned value in the prevention of strangles. Of the many preparations, that have enjoyed a more or less ephemeral reputation in the field, *Streptococcus equi* bacterin has achieved the greatest popularity. Comparatively few, however, have retained faith in it for more than a short time.

The greatest protection lies in avoiding those insanitary conditions named in the foregoing as contributing to the severity of the attack; in an early recognition and strict segregation of cases and in measures to enhance the vigor of uninfected animals.

[1] Seymour, R. T., Lieut. Col., V. C. and 1st Lieut. Daniel S. Stevenson, 1942. *Army Vet. Bul.* 36:2, pp. 81-92.

Equine Influenza

1. *Synonyms.*—Shipping fever, pink eye, catarrhal fever, stockyard fever.

2. *Geographical Distribution.*—All parts of the world.

3. *Cause.*—A filterable virus.

4. *General.*—Influenza is constantly present among solipeds in the United States and all other major horse raising countries. Like influenza in man it occasionally occurs in panzootics. One such epizootic wave, about which little is known, occurred in the United States in the 1830's. In 1855-56 and again in 1871-72, great panzootics of equine influenza occurred which, for weeks, paralyzed transportation in all large American cities—in fact put ox teams on Broadway (New York) and State Street (Chicago). During World War I, it was present in epizootic proportions in the remount stations of all armies.

Among small numbers of animals that are well cared for, influenza usually runs an uncomplicated course and the mortality is light—less than 0.5%. Where large numbers of "green" horses are assembled; where they are subjected to the hardships of shipment; exposure to inclement weather; crowded into insanity corrals or forced to endure other devitalizing influences, it becomes a devastating scourge prone to complications, particularly pneumonia, from which the mortality is high. Under unusually unfavorable circumstances the mortality was 100% among approximately 1000 animals in at least one instance in France during World War I.

The virus is present in all body fluids of the infected animal and is spread by the eye and nasal discharges, the saliva, semen, urine, feces, contaminated drinking water, feed and surroundings. Recovered animals carry the infection in their blood for an extended period. Bergmann reported finding it in the semen of a stallion that had recovered from the disease six and one-half years earlier.

Three types of the disease—nasal, pulmonary and intestinal—are common. They have been regarded as separate entities by some. During World War I, there were a great many cases in which intestinal involvement predominated. Since influenza was looked upon as a respiratory disease, this mainly intestinal ailment was thought by many to be a different disease. Few such cases have been reported since the close of the late war, but with the better understanding of viruses and their tendency to exhibit tissue specificity, the consensus is that this intestinal disease is due to the influenza virus, which for some reason has found the mucous membrane of the intestinal tract more congenial to its development than was found in the respiratory organs.

The other two types of influenza—catarrhal and pneumonic—some also regard a being due to different viruses. However, the majority regard the latter as an extension or sequel of the former. The whole subject of influenza is about as clear as a bottle of Grade A pasteurized milk.

As was stated in the discussion of strangles, that disease and influenza resemble one another in many respects. Much of the discussion of strangles applies equally to influenza and need not be repeated. Such differences as obtain are mainly differences in degree. The temperature is rather higher in influenza than in strangles—107°F. being commonly reached; the cough is more pronounced; the tendency to develop into pneumonia is greater; the incubation period is shorter—rarely more than six days and sometimes apparently only one day; the course is more acute; suppuration of lymph glands is not so universal; the swelling of tendon sheaths, tendinitis and arthritis are more common, and vigorous animals escape the attack in a far higher percentage than is the case with strangles. Finally unlike strangles, the age of the animal does not affect its susceptibility to influenza.

"Shipping fever" is more applicable to influenza than to strangles, since outbreaks commonly originate in market centers or on rail journeys. Strangles as we have seen, although it may originate in a similar manner, is also indigenous in practically all studs of considerable size.

5. *Symptoms.*—Attacks of influenza begin with malaise, loss of appetite, a high temperature and inflammation of nasal mucous membrane from which there is a serous discharge. The nasal involvement may progress as a simple catarrh or the discharge may cease before reaching the purulent stage. Laryngitis, accompanied by a harsh, dry, painful cough, is an early symptom. The cough becomes more moist as the catarrh extends to the bronchi. At first, the eyes present a photophobia followed by acute conjunctivitis and there may be considerable swelling of the eyelids. There is stiffness and tenderness of the muscles all over the body and an extensive tendinitis and synovitis—the joints creaking and crackling when the animal moves. The head is extended, there is extensive swelling of the gutteral region and suffocation may ensue. By the third day depression is marked. Exacerbations occur frequently with the advent of stormy weather, even though the animals be not exposed to it; resembling in this respect rheumatic attacks.

The inflammation is prone to extend to the lungs and result in anything from increased vesicular murmur, to pleuritis, and lobar pneumonia, oftentimes with fatal termination.

6. *Treatment.*—The treatment of equine influenza does not differ materially from that recommended for strangles except that incising abscessed lymph glands is not so commonly necessary. The same good nursing; the same protection from chilling; the same protection from stifling stable atmosphere; the same support of the heart and the same watchfulness to prevent suffocation, are as necessary in the treatment of influenza as in the treatment of strangles. Where catarrhal symptoms are prominent, nasal irrigation gives the same marked relief that it does in strangles.

Seymour and Stevenson received much satisfaction from blood transfusion (500cc daily) in depressed and weakened cases and from neoarsphenamine (3gm in 200cc of distilled water intravenously). The neoarsphenamine injection was given every other day in a long series of cases. When administered early in the attack, the temperature fell promptly and the general appearance and attitude were much improved.

A freshly prepared aqueous solution of mercurochrome (200cc of a 1% solution daily) administered intravenously, gave gratifying results in the small number of

Army Veterinary Hospital, Fort William McKinley, Philippines

cases on which it was tried. The same authors also found that seven grains of potassium iodide (daily for three days), in a gallon of water, via stomach tube, was most useful in cases in which there was great swelling about the throat. It avoided the need for intubation in most of such cases. Strychnine sulphate and camphor in oil was employed, by these authors, to combat the depression.

Cases with grave intestinal involvement run a rapid course, usually to a fatal termination. Prompt supportive measures, plasma injections or blood transfusions, strychnine, digitalis, etc., are required. The dehydration must be overcome and the depleting diarrhea brought under control within a few days or death is inevitable. For the dehydration intravenous injections of a hypertonic saline solution and drinking water *ad lib.* are required. For the diarrhea tincture of opium is a specific but since it is difficult to obtain, the new drug sulfaguanidine deserves a trial.

What was said of the reliance upon sulfanilamide in strangles applies with equal force to influenza, since the principal secondary invaders are *Streptococcus equi* and *Pasteurella equiseptica* of which the former is the commoner and the more important of the secondary invaders.

7. *Prophylaxis.*—No specific immunizing agent against equine influenza is known. Reliance must be placed upon early recognition, prompt segregation, good sanitation and hygiene, and the avoidance of those conditions that contribute to the onset and severity of the disease.

Equine Contagious Pleuropneumonia

1. *Synonyms.* — Equine croupous pneumonia.

2. *Geographical Distribution.* — Worldwide.

3. *Cause.*—A filterable virus with *Streptococcus equi* and often *Pasteurella equiseptica* as secondary invaders.

4. *General.*—All pneumonias in the horse are due to bacterial action. Some are due to organisms, normally present in the respiratory tract, which become pathogenic because of injury to the respiratory mucous membrane from irritants or disturbed circulation. They are not regarded as communicable. The task of determining by clinical examination and anamnesis, whether a sporadic case of pneumonia is or is not infectious and contagious is often difficult. The circumstances attending and preceding the development of the case should receive careful consideration since the course and symptoms may be identical in infectious and non-infectious types of the disease. Both types require segregation, but only the infectious type requires strict quarantine and elaborate disinfection. Where there is doubt the case should be regarded and handled as infectious.

Equine contagious pleuropneumonia is the type of pneumonia most common among army animals. The predisposing causes are the same as those of influenza. The primary cause is a virus. Much evidence has been adduced to indicate that the virus of pneumonia is distinct from the virus of influenza and the viruses that are suspected of causing strangles and colds but none of it is conclusive. Like influenza, virus pneumonia is complicated by a secondary infection of *Streptococcus equi* and usually also by *Pasteurella equiseptica.* In addition a large number of organisms, normal saprophytic inhabitants of the respiratory tract, are involved in the inflammatory process. Because of the unknowns in the etiological consideration of equine contagious pleuropneumonia, it is not possible to say definitely whether it is an extension, a complication, a sequel of influenza, or whether it is a concurrent infection due to the same predisposing factors but to its own specific virus. It should be differentiated from the following types of pneumonia.

a. Croupous pneumonia (non-contagious) is due to organisms that are ordinarily saprophytes in the respiratory tract of the horse. Their pathogenicity is brought about by external influences, such as cold, irritating fumes, overexertion, transportation, permanent stabling in insanitary buildings, etc., that lower the resistence of the pulmonary mucous membrane to bacterial invasion. It is lobar in type.

b. Catarrhal pneumonia, bronchopneumonia, lobular pneumonia, (non-contagious) is usually preceded by a bronchitis. It is commonly due to the entrance of foreign bodies into the bronchi, to parasites, or the inhalation of very hot air, smoke, or irritant gases. The same organisms that cause croupous pneumonia are involved, but in this type the *P. equiseptica* is the more likely to be a factor. Unhygienic conditions and exposure to cold are important predisposing causes. Gangrenous areas are prone to develop at the site where these foreign bodies, whether liquid or solid, lodge. It may be followed by purulent pneumonia or general pulmonary gangrene.

c. Chronic interstitial pneumonia is differentiated from the infectious types by its chronicity and the fact that it is ordinarily an extension of chronic catarrhal bronchitis.

d. Pneumonia due to gas poisoning (chemical warfare agents) is characterized by the sudden development of a distressing cough, an acute bronchitis and, in severe cases, the development of severe pulmonary edema signalized, within 24 hours, by a trumpet-like dilation of the nostrils. Another symptom of differential, in fact, of pathognumonic significance when present, is the very early onset (often within 12 hours) of a profuse nasal discharge—grayish-white or greenish-yellow in color, sometimes flecked with blood. In some cases the odor of the gas used can be detected on the breath. Always a rapid pulse, vesicular murmur and evidences of pharyngitis and

PART OF THE BROODMARE BAND AT FRONT ROYAL REMOUNT DEPOT

bronchitis precede the elevation of temperature by some hours.

5. *Symptoms.* — Where equine contagious pleuropneumonia follows an attack of strangles or of influenza, the symptoms of the former diseases gradually are merged with those of the pulmonary disease or more often the latter are merely added to the former. Where the pneumonia appears as the primary infection (pulmonary form of influenza) there is an abrupt rise of temperature (104 to 106°F.). The respirations increase to 30 or even 60 and the pulse from 50 to 100 per minute. Sometimes, but not commonly, there is a slight yellowish, or more often, brownish discharge from the nostrils. A variety of rales are present depending upon the stage and degree of bronchial involvement. Pleurisy is always present in greater or less degree from the fourth day and modifies the breathing. At about this time symptoms of cardiac involvement supervene; the pulse becoming arythmic and weakened. The temperature falls either gradually or rapidly after about ten days and convalescence begins; or in fatal cases there is increasing cardiac disturbance, the nasal discharge becomes bloody or icteric, the breath has the odor of pulmonary gangrene, hydrothorax becomes pronounced and the patient succumbs from toxemia and circulatory failure.

6. *Treatment.* — Equine infectious pleuropneumonia requires the same good nursing that is imperative for strangles and influenza. Protection from cold, from drafts, from getting wet, and from stuffy ill-smelling stables, are primary requisites as is also good grooming; bandaging the legs when needed; bathing the eyes; blanketing when the atmosphere is chilly, furnishing fresh clean drinking water and clean appetizing feed. The manger and feed box should be washed and disinfected daily. On warm quiet days the sick animal will benefit much from standing in the sunshine several hours.

For feed, Seymour and Stevenson recommend alfalfa and prairie hay and a grain mixture comprised of 320 pounds crushed oats, 50 pounds bran, 20 pounds linseed meal and 10 pounds of brown sugar. The animal should be fed all it will eat and salt should be kept constantly available.

Supportive treatment should include fluid extract of nux vomica to stimulate the appetite and as a general tonic; digitalis to support and rest the heart, and tradition requires Fowler's solution. If the animal drinks but little, as is apt to be the case when digitalis is administered, thirst should be stimulated by intravenous injections of hypertonic saline solutions. One thousand cubic centimeters of a 10% salt solution (sodium bicarbonate 5%, sodium chloride 4%, magnesium chloride and potassium chloride aa. 0.5%) will cause the animal to drink several gallons of water immediately. During the latter half of the course of the disease, when the heart is showing the effects of the general intoxication, intravenous injections of 50% glucose solution should be given in addition to the digitalis. This will nourish the overburdened heart and improve the circulation, and at the same time combat dehydration by causing the animal to drink copiously.

FRENCH ARMY MULES

As soon as the rales become crepitant or moist, ammonium carbonate or ammonium chloride should be given to liquefy the exudate in the bronchioles and air cells and to facilitate its removal. However, if ammonium chloride is given in full dosage for longer than about six days it will increase the cough to an exhausting degree. It should be discontinued when this effect begins.

In a crisis, for a quick temporary lift, 2000cc of blood may be given by direct transfusion. If indirect transfusion is employed, the injection of this amount of citrated blood should be preceded immediately by an intravenous injection of 30 to 50gm of calcium gluconate.

The sheet anchor in the treatment of equine pneumonia of all types is sulfanilamide. The earlier its administration is commenced the more efficacious it proves. A horse weighing a thousand pounds should receive 20 to 30gm every eight hours until 24 hours after the temperature falls to not more than one and one-half degrees above normal. The dose should then be reduced to 15gm three times daily and continued at that level for four days. It is very important that sulfanilamide be administered at not longer than eight-hour intervals. It is eliminated rapidly and if not administered at eight-hour or shorter periods, the effect is not continuous and it is nowhere nearly so efficacious as when given properly.

The best method of administering sulfanilamide to a horse is in capsules, however, in infectious pleuropneumonia there is sometimes so much pharyngitis as to make this hazardous. The drug is insoluble in ordinary solvents but can be washed down in suspension in molasses through a stomach tube if the pharynx is in condition to permit its passage.

7. *Prophylaxis.*—The prevention of equine infectious pleuropneumonia in no way differs from that of equine influenza which is discussed elsewhere.

In all military campaigns heretofore conducted in the Middle East chief reliance for transport has been upon the camel—"ship of the desert"

Purpura Hemorrhagica

1. *Synonym.*—Petechial fever.

2. *Geographical Distribution* — Worldwide.

3. *Cause.*—Unknown. Likely a toxemia; possibly an anaphylaxis.

4. *General.*—Purpura hemorrhagica is not infectious and cannot be produced artificially. It is, however, always associated with microbic action. In army animals it is ordinarily a sequel to strangles, influenza, infectious pneumonia or pharyngitis and rarely to nasal catarrh and chronic sinusitis. Essentially it is an impairment of the blood vessel walls that permits the blood plasma, and to a lesser extent the whole blood to escape into the tissues and cause sharply circumscribed swellings. All the other symptoms are secondary and due to mechanical interference, impaired nutrition or secondary bacterial invaders.

The condition *per se* is afebrile. Elevation of temperature that may exist in the beginning, is due to the primary disease and, late in the attack, to toxins produced by the secondary infection. The course of the ailment is exceedingly variable. The progress of the swelling and the extension of hemorrhages may be arrested at any time or the condition may last for weeks, entailing great loss of flesh through a greatly prolonged convalescence or terminate fatally. On the other hand the condition may be very acute and terminate fatally in 12 hours to two or three days—usually in these peracute cases the mortality is from suffocation.

Purpura hemorrhagica may occasionally occur from causes other than those mentioned in the foregoing. Such cases have not been reported in army animals.

5. *Symptoms* and *Lesions.*—Small hemorrhages into the nasal mucous membrane are quickly followed by edema of the subcutaneous tissue of the nose and face. After a varying period the legs swell—the edema beginning at the feet and extending up the legs but always ending abruptly at the top. Urticaria-like swellings may appear on various parts of the body. The swellings are cold, painless and pit on pressure. The petechial hemorrhages extend to all the mucous membranes in the body and later into the skin, the subcutaneous infiltration, the muscles, periostium, etc. Ulcers frequently develop in the intestinal and conjunctival mucous membranes. Slight to severe or fatal edema occurs in the lungs. Swelling in the nasal mucous membrane or in the larynx may cause suffocation.

Where the swelling is extreme, as it frequently is, the skin is prone to crack and pieces of it slough out after 10 days to two weeks. The subcutaneous extravasate may be one to two inches deep. In time it is invaded by putrefactive bacteria and gangrene, sloughing and toxemia ensue. Until this occurs the temperature is normal and the breathing normal to labored, depending upon the amount of involvement of the respiratory organs. The hemorrhage into the masseter muscles makes eating difficult. The hemorrhage into the locomotory muscles renders movement unsteady and perhaps painful. There is usually a persistent diarrhea with putrid smelling feces mixed with shreds of tissue.

6. *Treatment.*—When no treatment for a condition is effective, invariably many are recommended. This is conspicuously true of purpura hemorrhagica. Among biological remedies large blood transfusions and intravenous injections of antistreptococcic serum have the greatest number of advocates.

Among chemical remedies the intravenous injection of formalin ranks easily first in the number who use it. One to three drams are administered daily in 1 to 2% aqueous solution. Second in popularity is acriflavine, 200 to 300cc of a 1 to 1000 solution.

Among the newer agents, vitamin K, oxalic acid, thrombin, and blood plasma would seem worthy of trial.

The trachea tube should be inserted if suffocation threatens. The sloughing should be treated surgically.

In any case good nursing, deep bedding, removal of pressure (halter), restricted movement, fresh water, palatable, easily-

digested feed, good grooming, comfortable surroundings, etc., are prime requisites.

7. *Prophylaxis.*—The prevention of purpura hemorrhagica depends upon the prevention of the primary diseases to which it is a sequel. The factors that bring about the sequel are not understood and no means of preventing them are known.

Hemorrhagic Septicemia

1. *Synonyms.*—Shipping fever, stockyard fever.

2. *Geographical Distribution.* — World-wide.

3. *Cause.* — *Pasteurella equiseptica* (equisepticus).

4. *General.*—There is a pasteurella or bipolar organism for each of the domestic animals, boviseptica, suiseptica, oviseptica, aviseptica, bubalseptica (water buffalo), leptiseptica (rabbit), etc. These organisms are widely distributed in soil, water and in the respiratory and digestive tracts of animals where they are normally saprophytic. What causes them to become highly virulent and set up a disease which is readily transmitted is speculative. It probably occurs less frequently in the horse than other domestic animals and fowl. Some veterinarians habitually refer to particularly acute and malignant cases in outbreaks of influenza as hemorrhagic septicemia. In some cases this diagnosis may be correct; probably in a larger number it is an error. Hemorrhagic septicemia, if it occurs at all as an independent disease in the horse, is not certainly distinguishable clinically from other respiratory infections. As a complication of influenza and more frequently of infectious pneumonia it is common. These diseases and their complications have been discussed elsewhere. Bacterins have long been popular as a preventive and to a less extent as a treatment for certain pasteurelloses. Because of the difficulty of determining whether or not the *P. equisepticus* is involved in a given ailment of the horse, until after the animal is dead, "Hem. Sep." bacterins for this animal are difficult to evaluate.

Equine Infectious Bronchitis

1. *Synonyms.* — Contagious cough of horses, epizootic laryngotracheitis.

2. *Geographical Distribution.*—Europe and perhaps elsewhere.

3. *Cause.*—A filterable virus.

4. *General.*—There is some doubt that infectious bronchitis occurs in horses as a separate disease and is not just a mild form of influenza. However, the consensus is that it is a distinct entity due to a specific virus.

5. *Symptoms.*—The disease begins with a rhinitis and a conjunctivitis and the larynx is sensitive to pressure. Two to four days later there is a moderate elevation of temperature lasting only a few hours. At the same time a harsh, dry, somewhat painful cough sets in and there is also swelling of the lymph glands of the throat. The swelling subsides after three or four days but the cough continues two or three weeks. The appetite is normal except on the day that the fever appears.

The infection spreads rapidly and one attack confers about the same degree of immunity as an attack of influenza.

Neglected cases may develop a secondary streptococcic infection which may run a course similar to the secondary infection in influenza.

6. *Treatment.*—These cases require the same care as mild cases of influenza. If protected from cold and insanitary and unhygienic conditions they recover spontaneously.

A CHINESE "TRACTOR"

Mange

1. *Synonyms.*—Scabies, acariasis.

2. *Geographical Distribution.* — Worldwide.

3. *Causes.* — *Sarcoptes scabiei* var. *equi*, *Psoroptes comunis* var. *equi*, and *Chorioptes equi*.

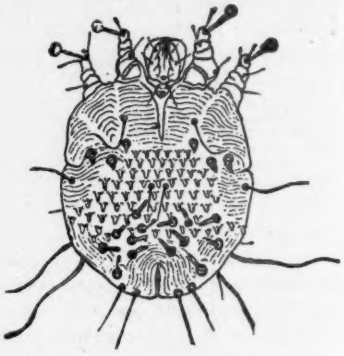
4. *General.*—With the conquest of glanders, mange has become the most serious plague of army animals. A good veterinary service, if given the opportunity, can hold it in complete check and cause little interference with the use of the animals. However, the commander's views of military necessity often render it a difficult disease to handle. It is essentially a disease of debilitated animals — those that are overworked, underfed, and insufficiently groomed. Among such animals it spreads by contact (direct or indirect) with great rapidity and, if unrestrained, will completely disable the animals in a command in a few weeks. It is estimated that a single fertilized female mange mite may have a progeny numbering one and one-half million in 90 days.

No other disease can so quickly incapacitate a whole command of seasoned animals. It is far more serious in winter than in summer and in animals with long coats than in those that are regularly clipped. Filth, a long coat, cold weather, lack of feed, overwork, and debility set the stage for a maximum performance by the mange mite.

There are three types of mange—chorioptic, psoroptic and sarcoptic. Only the latter spreads rapidly or is of serious consequence in military animals. Chorioptic mange is usually confined to the legs; psoroptic mange to the mane and the root of the tail. Both types spread slowly and are amenable to topical treatment. Sarcoptic mange attacks all parts of the body but is likely to appear first in the intermaxillary space and about the ears and eyes.

The sarcoptic mange mites are from 1/100 to 1/50 of an inch in length and, under favorable circumstances, barely visible to the naked eye. Under magnification they are readily identified and differentiated from the psoroptic and chorioptic species. They also attack other animals and man, when in close contact with mangy horses, but soon leave these unnatural hosts. The following discussion refers to sarcoptic mange.

5. *Symptoms.*—The first symptom noted is an itching of invaded areas, becoming more severe as the infestation advances. Soon the pruritus is so intense that the animal rubs all objects it can reach, bites and kicks continually and may become almost unmanageable. The hair is shed or rubbed off in irregular patches which rapidly coalesce to form large bare areas. This may continue until most of the body is denuded of hair; sometimes within a period of two or three weeks. The skin, at first, reveals vesicles and papules but later becomes greatly thickened, much wrinkled and leathery. Diagnosis is confirmed by finding the mite, its eggs or feces, under the microscope. The search should be made in deep scrapings and even then, in old chronic cases, considerable difficulty may be experienced in finding the parasite. Its feces are much less difficult to find.



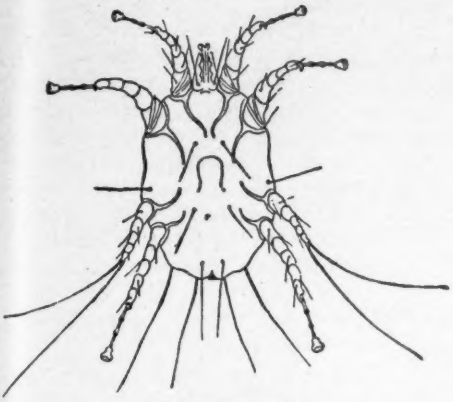
Sarcoptes equi[1]

This burrowing mite has spines, scales and bristles on its back and is responsible for sarcoptic mange in solipeds

6. *Treatment.*—The mange mite is easily

[1] Veterinary Hygiene, *Klimmer*. Courtesy Alexander Eger, Publisher, Chicago.

killed by contact with a wide variety of parasiticides; the eggs are more resistant.



Psorcoptes equi[1]
Psoroptic scabies among solipeds is caused by this sucking mite

The parasite lives and deposits its eggs in a highly-protected location. It is necessary to repeat most treatments several times, at weekly or more frequent intervals. However, after the second treatment the acute symptoms should be relieved and after two or three weeks the bare spots should start to hair over unless the hairlessness be chronic.

Chorioptes equi[1]
This eating mite causes foot mange among horses

Where it is feasible to dip all the horses in an organization, management of an outbreak of mange presents no difficulty. Either the standard lime and sulphur or the standard arsenic dip is satisfactory, but usually it is not until the outbreak has become severe and has involved a majority of the animals in an organization that they can be evacuated for treatment. This emphasizes the importance of recognizing the disease early when applications by hand or with a spray pump are not too laborious to be carried out thoroughly. Dipping possesses serious drawbacks when the temperature is more than 10 or 15 degrees below freezing; even at freezing temperatures dipped animals require windbreaks for an hour.

Demodex folliculorum, **var.** *equi*[1]
The demodetic mange mite is easily detected on microscopic examination. Here are five stages of the mite, from egg to mature "grub." ***D. folliculorum*, var. *equi* has been described as identical with *D. folliculorum*, var. *hominis***

When mange is discovered early in an attack and only a few animals and but small areas are affected, hand application of parasiticides are preferable to evacuation for treatment. Hand treatment, whatever the extent, is facilitated by clipping but in cold weather, and that is when mange is worst, some objection to clipping may be raised. Hand treatment, except the Russian treatment or those having an oil or grease base, should be applied twice a week or even oftener. Preparations that are effective in the treatment of mange when applied with a sponge or spray pump include:

a. Standard lime and sulphur dip.

b. Standard arsenic dip.

[1] Veterinary Hygiene, *Klimmer*. Courtesy Alexander Eger, Publisher, Chicago.

Debility is both a cause and an effect of parasitism. The vigorous well-fed and well cared for, mature animal is practically immune to the ravages of most internal parasites and possesses a high degree of tolerance to mange mites

c. Lime-sulphur solutions.

d. Vienna tar liniment.

e. Kerosene emulsion and various oily preparations in which some compound of sulphur is incorporated.

f. The Russian or "one day" treatment.

Oily preparations possess the advantage of requiring less frequent application and limiting the spread of the disease where segregation cannot be accomplished. They possess disadvantages in that they cannot be used in hot weather on animals exposed to direct sunshine, nor can they be used on animals exposed to severe cold. Further, they soil stable fixtures, harness, blankets and other equipment used about the treated animal.

In the A.E.F., preference was for a pomade consisting of: Flowers of sulphur two parts, paraffin and sodium carbonate of each one part, and lard or cosmoline seven parts. It was applied generously with a stiff brush, and the excess scraped off the following day. After six days the animal was washed with soap and water. One application was usually sufficient.

"Sulphur lather tablets" is a preparation combining 18% of sulphur in a bland soap, when applied to the body in a lather and left to dry covers the surface with a fine film of sulphur. Its advantages over sulphur ointment are said to be:

(1) Only one-twentieth as much of the emulsion soap is required to cover a given surface as is required of sulphur ointment.

(2) It is less messy than ointment and easily removed.

All hand applications should be preceded by a thorough washing of the part with soap and warm water, using a stiff brush.

Where a dipping vat or gas chamber is not available and hand treatment of mange must be undertaken, no other is so generally satisfactory as the Russian mange treatment developed by Professor Dimianovich. It is carried out in the following manner:

a. Clip the horse, removing all the long hair.

b. Wash thoroughly with soap and warm water to remove scabs.

c. Apply a 60% solution of sodium hyposulphite to the whole body. (It takes one man 30 minutes to apply the solution to one animal.)

d. Allow the horse to dry for about two hours.

e. Next apply a 10% solution of commercial hydrochloric acid to the whole surface of the body. This also takes one man about 30 minutes.

Both the hyposulphite solution and the hydrochloric solution are best applied with a moderately stiff brush.

f. When the horse is dry the treatment is repeated. In mild cases of mange a cure follows immediately the first two treatments and, after three days, the horse can be washed with soap and water and released from quarantine.

If the mange is very advanced, a third treatment two or three days later is required.

The success of the treatment depends largely on the care with which it is carried out. When the horse is dry after the application of the hyposulphite solution, it is necessary to make sure that the whole body has been treated as judged by the white deposit. Any areas that have been missed must be redressed.

Each dressing takes about three pints of each solution.

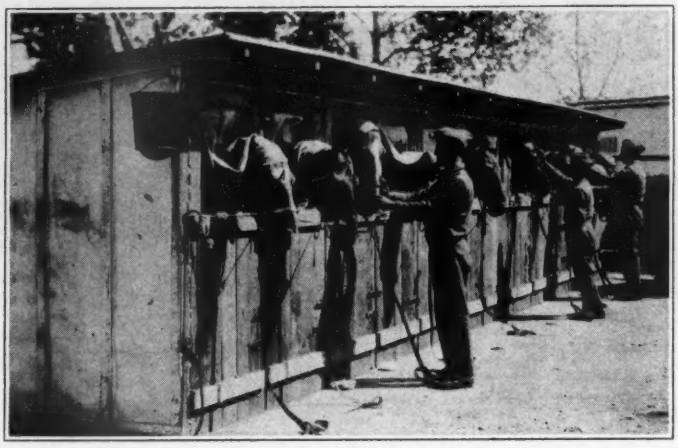
Horses like the treatment and respond to the friction of the skin.

The pruritus disappears the day following the first treatment.

Injury, as a result of the treatment, to

the skin or to the general condition of the animal has not been observed, nor has analysis of the blood or urine shown any change.

The treatment is equally as effective for psoroptic and chorioptic mange as for the sarcoptic variety and for dogs as for solipeds. For demodectic mange in dogs six



A view of the sulphurizing chamber in the veterinary hospital at Neufchateau, France, 1917. Its operation was so satisfactory that, following the Armistice, similar facilities were constructed for each division. The sulphur gas (SO_2) was generated by burning the sulphur of which about one pound per animal is required for a treatment. The animal should be exposed to a high concentration of this gas for approximately one hour. The temperature in the gas chamber should be maintained between 90 and 100°F. — *Vet. Mil. History*

single treatments at three-day intervals are recommended.

Where the skin is hard, hairless, and leathery, raw linseed oil may be rubbed into it once a week to advantage.

7. *Prophylaxis and Control.*—Good horse mastership and diligence in detecting and early segregation of sporadic cases of mange serve to protect a command adequately.

Where the animals are overworked, underfed, and debilitated the task of preventing mange becomes difficult. If, in addition, slightly affected animals must remain at work with their organizations, the problem will try the resourcefulness of the veterinary officer. Rest, when obtainable, liberal feeding, good grooming, clipping, early detection of cases and indefatigable hand treatment must be prosecuted uninterruptedly.

When animals of a command are badly infested, the first opportunity should be grasped to give them complete rest and institute regular dipping, good care and feeding. Whether this is best accomplished by evacuating the animals to a veterinary hospital or building a dipping vat and carrying it out in the organization will, of course, depend upon circumstances. Both time and cost will ordinarily be saved by evacuation to a veterinary hospital, where the treatment will be in the hands of trained personnel.

In cold weather, with no protection available for the animals, mange may be treated successfully by means of gas chambers. This method was much used in the A.E.F. in World War I. The French preferred the gas chamber to the dipping vat as a means of controlling mange.

Recently Gapuz has reported success in the treatment of both sarcoptic and psoroptic mange in carabaos and oxen in the Philippine Islands with derris infusion and emulsion of derris in coconut oil.

Treatment of mange must be accompanied by disinfection always. The parasite can live for several weeks on harness, blankets, grooming kits, feedbag, bedding, manger, feed box and all stable fixtures and it can be communicated to other animals by contact with these articles. Any reliable disinfectant is satisfactory for the destruction of mange parasites when off the host. A 5% creosol solution is perhaps the one of choice for the grooming kit and similar articles. Leather should be washed thoroughly with soap and water and then oiled. Stable fixtures are best disinfected by a 1% solution of lye.

Ringworm

1. *Synonyms.*—Trichophytosis, barn itch.

2. *Geographical Distribution.* — Worldwide.

3. *Cause.*—Various species of Trichophyton and Microsporum, parasitic molds.

4. *General.*—At least four species of Trichophyton — *equinum, mentagrophytes, granulosum* and (rarely) *felineum*—are responsible for ringworm in horses. Two species of Microsporum, a genus related to Trichophyton, also may cause the disease.

Ringworm is a mycotic parasitism of minor importance among civilian-owned animals. Among military animals it sometimes spreads with astonishing rapidity. For example, a shipment of horses, in which only one or two appear to have a slight infection when loaded, may arrive at their destination a week later in advanced stages of the disease with great areas of the body surface denuded and raw. This, notwithstanding text-book statements that the incubation period of ringworm is one to four weeks. The explanation probably lies in the wide distribution of Trychophyton spores in the coats of the animals, awaiting only intimate contact, heat, and moisture to set off an explosive growth.

One year in the last decade, ringworm was responsible for more "days lost" by army animals than any other communicable disease. Last year it was fourth in the list, only strangles, influenza and rhinitis (among the infectious diseases) having caused a greater number of days of unserviceability in army animals. Only abrasions and wounds among traumatic ailments caused more lost time. It has existed, in at least one large cavalry post, continuously for several years; 30,000 hand treatments having been given for it in 1941, yet it persisted.

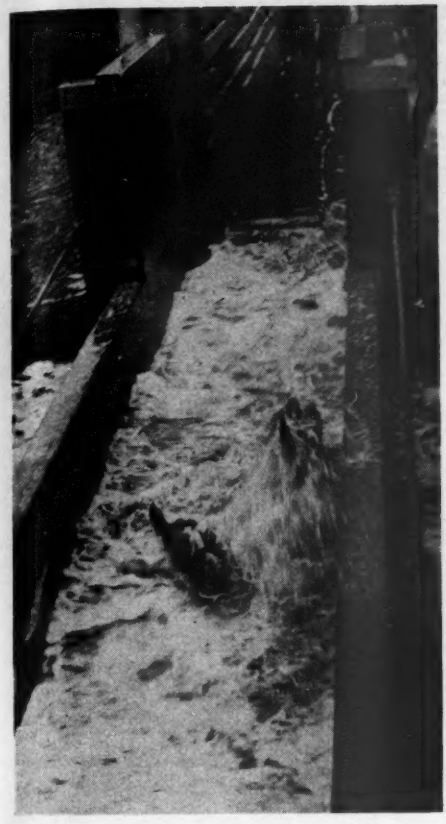
5. *Symptoms.*—The earliest symptom of trichophytosis in areas covered by hair is a small raised area in the coat. When examined, the hair pulls out easily and the skin is inflamed. Soon the infected spot is denuded and covered with a dry crust, which detaches easily leaving a raw surface that oozes serum. In the absence of treatment the affected areas extend at the edges and merge into others. In severe cases a large portion of the surface of the body may be involved. There is little tendency to heal in the center and form a "ring" such as occurs in man, on surfaces not covered by hair and the hairless portions

The roughened areas of the coat illustrate an early symptom of ringworm. Preceding this stage the areas where the hair stands more erect than normal are small, discrete and numerous

of the skin of an animal. Diagnosis is confirmed on microscopic examination, by finding the fungus (chains of spores) about the roots of hairs and in deep scrapings from the margins of actively affected areas.

6. *Treatment.*—Ringworm is probably the only condition in the horse, other than tetanus or similar nerve involvement, in which the well being of the animal is not favored by grooming. In ringworm the extension of the infection about the margins of affected areas is hastened by grooming. There is some although not a great deal of danger of infecting animals by the use of combs and brushes that have been used on infected animals.

Long coats afford considerable protection against infection and clipping contributes materially to its extension from animal to animal. Contrarywise, clipping facilitates the treatment of the animal already affected and also materially assists in the early discovery of infection, which is important in its elimination from a command. That is to say, unclipped horses do not acquire the infection as readily as those that are clipped; but having acquired it, the



Coming to the surface after an all-in plunge into the dipping vat at Fort Brown, Texas

lesions extend more rapidly and are more difficult to cure in unclipped than in clipped animals.

If facilities are available for dipping, an invasion of ringworm can be eradicated from a command promptly. If hand treatment alone must be relied upon, the eradication of the disease from large commands is difficult, if indeed possible, where the infection is extensive. Infection can, however, be held down to a point where it will cause little or no interference with working the animals.

All Trychophyton species are destroyed readily by any of the disinfectants that will penetrate the coat and scabs. Arsenic dip is, however, more effective than the others. A solution made by dissolving one pound of sodium arsenite in a hundred gallons of water is particularly efficacious since a good deal of the arsenic remains in the coat after the animals are dry and thus limits spread of infection. After several dippings in this solution the hair of the animal becomes so charged with arsenic as to render it for a long period, probably until shed, highly resistant to invasion by ringworm.

One disadvantage of the arsenic dip is the difficulty of properly disposing of it after its purpose has been served. It should not, of course, be discharged into streams nor where it will be washed into streams by rain. It must not be so disposed of, that animals will have access to it then or later, or so that it will contact the foliage of vegetation which the animals may eat.

For hand treatment of ringworm in horses and mules, clipping is extremely desirable, preferably clipping all the body surface and, in any case, an area considerably larger than that apparently infected. This measure alone will frequently result in prompt healing of the lesion. However, disinfectant applications should be used also. Among a wide variety of disinfectants that are effective there is little choice. Probably mercurial ointment USP has no superior. A solution of iodine in glycerin is even more commonly used. Solutions having a high percentage of alcohol, such as tincture of iodine, have the disadvantage of hardening albumen and thus protecting underlying mycelia and spores. Such solutions are less effective on exuding surfaces or on those protected by heavy scabs than aqueous solutions or oily mixtures.

7. *Prophylaxis and Control.*—Keep military animals away from contact with animals owned by the civilian population and out of stables that have been occupied recently by such animals.

Clip affected animals and avoid contact between them and unaffected animals.

Since animals are infected largely by lying on damp bedding, keeping the animals in dry corrals aids in limiting the spread of the disease. Ringworm is not spread readily by direct contact unless it be very intimate and the coat is wet with urine or sweat.

If the infection is even moderately extensive the probabilities are that practically all animals of the command carry the spores of the Trychophyton in their coats and if circumstances permit all should be dipped three or more times at weekly intervals. Where this is not practical they should be treated by hand application or by spraying all sporadic cases at its first appearance.

The administration of arsenic internally as a deterrent of tinea seems not to have been reported. It must be looked upon as a drastic measure justified, if successful, only as a last resort and under special circumstances. The use of arsenic as a "conditioner" in horses, charges the hair coat heavily with arsenic. This arsenic remains in the hair permanently and since Trichophyton infection initially grows upon and in the hairs, it might be unable to establish itself in the coat of an animal that had been given a course of arsenic. Of course, with the shedding of the arsenic charged coat, the immunity, if it existed, would be lost and further administration of arsenic internally may prove detrimental.

In this connection it should be pointed out that there is considerable evidence that the protracted administration of arsenic destroys many of the sweat glands in the skin and may be a cause of "dry coat disease" in horses. Since this condition renders horses practically useless in hot weather, it is, of course, a more serious ailment than ringworm. Hence, the course of arsenic internally, if used at all, should not be prolonged.

This illustrates soldiers of the A.E.F. dipping horses at Rebeval Barracks in France in 1919. This dipping vat was built by the French and later taken over by the Americans. Sulphur was difficult to obtain and a dipping solution of potassium polysulphide and arsenic was substituted for the lime and sulphur solution of choice.—*Veterinary Military History*

Enzootic Paraplegia

The British veterinary service in World War I reported cases of a peculiar paralysis that occurred among the army horses—12 in Egypt and 72 in Mesopotamia. The cause of the ailment was not determined. The extent of the paralysis ranged from single groups to practically all voluntary muscles. The flexors were affected more often than the extensors. All the animals that went down and when helped to their feet were unable to stand, if they were not put in slings, had to be destroyed because of injuries due to struggling. All that could remain on their feet, or that were kept on their feet by slings, recovered.

The most characteristic symptom of the disease was a slowing of the pulse rate, usually to about 26 per minute. In 12 to 48 hours after the first symptom, a rise in temperature to 103 or 104 F. was observed. Recovery required a week to 10 days after the height of the attack was reached.

Periodic Ophthalmia

1. *Synonym.*—Moon blindness.

2. *Geographical Distribution.*—World-wide.

3. *Cause.*—Unknown.

4. *General.*—Periodic or specific ophthalmia developed among horses of the Allies in only three locations—North America, France, and Italy, during World War I. Cases developed in small numbers in widely distributed remount stations in the United States and Canada. In both France and Italy the areas where cases occurred were definitely limited but within those areas they developed in large numbers.

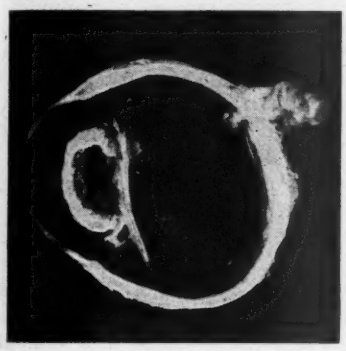


Photo by Schlotthauer

Cross section of an eye in a case of periodic ophthalmia, showing chronic destructive lesions. The fundus contained noncoagulable material; the lens has been absorbed and only the capsule remains; the retina has been pushed forward against the lens

It is not known that periodic ophthalmia is, or is not a communicable disease. Much evidence has been advanced that it is infectious, an equal amount that is a nutritional ailment—probably a vitamin deficiency. The theory that it is an allergy has considerable support. It may be, like laminitis, essentially a circulatory disturbance due to as undetermined cause or causes. As in laminitis the inflammation occurs within a structure that prevents swelling and causes great injury from pressure.

Medication had little or no effect on the outcome of the disease. Nearly all affected animals eventually became totally blind. This, however, did not interfere greatly with the use of the animals. Most, but not all of them, were allocated to the communications zone in the British service. In the American forces they were largely used in the combat zone. Both American and British veterinary officers (including Major General Sir John Moore) commented upon the fact that blind horses were usually in better flesh than their mates with normal vision. It is therefore a disease of comparative little importance among military animals.

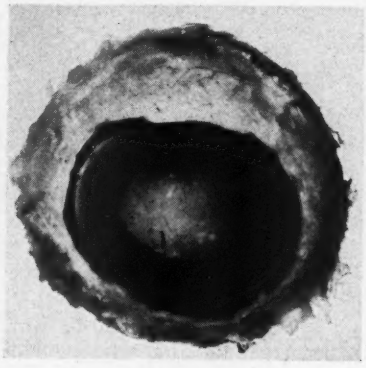


Photo by Schlotthauer

Typical cataract seen in cases of advanced recurrent ophthalmia

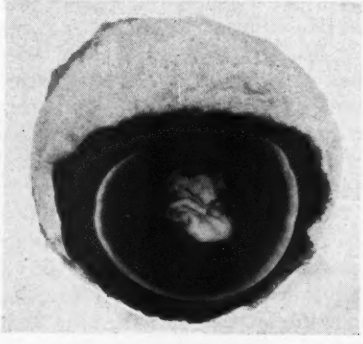


Photo by Schlotthauer

A capsular cataract projecting through the iris

6. *Prophylaxis.*—No method of preventing periodic ophthalmia is known other than moving the animals from localities in which it is indigenous.

Quarantine and Disinfection

1. *Quarantine.*—Quarantine is one of the oldest of the general preventive measures for the protection of the public health. Long before man discovered the causes of communicable disease and the manner of spread, observation and experience had led him to apply the first principle of prevention—isolation of the sick. In the Old Testament there are accounts of crude application of quarantine and isolation of persons afflicted with leprosy. During the years spent in the wilderness, Moses instituted various forms of quarantine. These early procedures were harsh as compared with the modern methods, for they frequently involved banishment from a city or community, and sometimes death for the afflicted. Primitive peoples rather commonly employed the latter means of disease control.

The taboo of a habitation in which a death occurred, had its origin, no doubt, in protection of the living from infections. This is a wide-spread custom of primitive peoples at the present time. Various of the Indian tribes in the southwestern part of this country, for example, abandon promptly, and never enter again, a hogan in which any member of the tribe has died. In effect this taboo amounts to quarantine of the infected premises.

Armies have adopted the same plan of quarantine as recently as the War between the States. In fact it was more recently adopted when General Von Mackensen, on account of the prevalence of typhus among the native population, delayed the advance of his army into Serbia for several months, during World War I.

In 1485, Venice adopted the rule that all vessels coming from infected ports should be detained for a period of 40 days, during which time they must lie in the harbor without intercourse with the land or other vessels. This 40-day period of detention explains the association of the word quarantine with such procedure. Some historians suggest that the time limit adopted by Venice was decided upon as a penance in keeping with the ecclesiastical period of Lent, and for many years "quarantine" meant detention of a person for 40 days.

Quarantine measures have undergone a gradual evolution in the past century, and procedures have become uniform throughout the world. Many changes have been necessary because of the development of knowledge in the sciences of medicine and sanitation, and in the etiology and epidemiology of communicable diseases. International uniformity in procedure has been brought about largely through various international sanitary conferences and the adoption of international sanitary codes by the important maritime nations of the world.

Army regulations provide that all newly-purchased animals on arrival at their first station shall be quarantined for a period of 21 days and that other army animals shall undergo a similar quarantine after a change of station. All infected, suspected and in-contact animals are required to be quarantined whenever there is an outbreak of an infectious disease among the animals of any military command. The length of the quarantine depends on the incubation period of the disease, for the control of which the quarantine is imposed and, of course, upon whether any further cases of the disease developed among the quarantined animals.

2. *Disinfection.*—Disinfection means the removal of infection regardless of how it is brought about. The objective of disinfection is the prevention of disease. Perhaps light, particularly sunlight and drying, rank first in accomplishing disinfection. Biosis, such as putrefaction, fermentation and overcrowding, likewise destroy a vast amount of infection. On the whole these natural processes are far more important than the artificial light and chemical agents used in disinfection for disease control.

However, for the immediate control of given outbreaks of infectious disease the veterinary officer cannot wait for the processes of nature, but must resort to artificial means of destroying infection. In the use of these his success will depend largely upon the selection of agents adapted to the particular purpose and the thoroughness with

which he carries out the process. A hundred percent disinfection is rarely achieved outside the bacteriological laboratory or the surgery, but overcoming mass infection can be accomplished (except perhaps in the case of infected soil) and this incomplete disinfection, alone or in conjunction with biosis is ordinarily adequate.

Disinfectants: Antiseptic, germicide, and disinfectant are terms somewhat loosely used. In a strict sense an antiseptic is an agent that prevents bacterial development (anti = against, sepsis = rotting), a germicide is an agent that kills germs (germ plus caedere = to kill), and a disinfectant is an agent that destroys infection (dis = apart, inficere = to corrupt). As commonly used, there is much overlapping of these terms. Further, various agents fall into two or more of these classifications depending upon the dilution in which they are used, the period during which they may act upon bacteria and other conditions.

Heat may be taken as an example of an agent that falls readily into different classifications. Pathogenic organisms have a narrow range of temperature adaptability. Their optimum range is near the body temperature of the animal affected. Above or below that temperature, growth is slowed and much departure stops it. Anthrax organisms will not grow in temperatures lower than 53 nor higher than 110°F. so temperatures above or below this range may be said to be antiseptic for this particular organism. At a temperature somewhat higher than 110°F., the vegetative form of the organism is destroyed so this temperature is germicidal for that form of the organism. Exposure to a moist temperature of 212°F. for 10 minutes or longer, or to a dry temperature of 375°F. for several hours, destroys anthrax spores and such temperatures are therefore, disinfectants, so far as the *Bacillus anthracis* is concerned. Since the vigor of chemical reactions usually is increased by heat, most chemical disinfectants are more active when warm than when cold, and all, if progressively diluted, lose their power to destroy bacteria, becoming first antiseptics and then innocuous.

Disinfection is logically carried out in three processes — preparation, selection of the disinfectant, and its application, of which the first is the most difficult and most frequently poorly done.

Preparation: The germicidal effect of all disinfectants is lessened, and of some of

Quarantine ward of one of China's ancient temples

them completely nullified by the presence of trash, manure, mucous, blood, pus and other organic matter. It is vitally important that such objects be removed, even to scraping the surfaces if necessary. Following such cleaning, the premises should be washed thoroughly with soap and water. Only when no more of the infection can be removed by reasonable mechanical means should the agents to destroy bacteria *in situ* be employed.

The material removed from an infected stall, stable, corral, watering trough, or equipment, etc., should be properly disposed of so as not to constitute a hazard to animals. Fire is the method of choice for disposing of such material. Where it cannot be burned, it may be soaked thoroughly with a very strong disinfectant and fenced so that animals cannot gain access to it.

Selection of the disinfectants: There are a large number of agents that destroy bacteria—heat, light, dehydration and many chemical compounds. The action of disinfectants on organisms varies. Some coagulate the protein (heat, heavy metals), some oxidize it (hydrogen peroxide, potassium permanganate), some enter into combination with it (dyes, sulphur), some dissolve it (alkalies), some dry it by extracting water from it and some act perhaps in other ways.

Some are far more effective against certain organisms than they are against others. Some are dangerous to animals and personnel and some are relatively harmless. Some are active under one set of conditions and comparatively inactive under other conditions. Carbolic acid, for example, is active in warm aqueous solution but is comparatively inactive when cold or in oil. Its disinfectant properties may be increased as much as eight times by raising the temperature only ten degrees. The mercury compounds are neutralized by albumin; alcohol is more effective in a solution of 60% than in stronger solutions, etc. There is no disinfectant universally applicable in disease control, however, among the five most generally applicable are heat, the cresols, lyes (including soaps), certain bactericidal dyes and the halogens; one or more may be found suitable in most conditions.

Heat is dependable if used in sufficient degree. There are various ways of applying it, depending upon circumstances. The gasoline blowtorch affords a convenient means of applying heat to metal surfaces and within limits to wood surfaces. However, the flame must be played upon the surface sufficiently long to raise the temperature to a lethal point for bacteria. Where a railway locomotive is available live steam offers an effective means of applying heat. Its principal use is in disinfecting railway cars. The point of the steam hose, however, must be held close to the surface being disinfected and a steam pressure of at least sixty pounds must be had. Limited areas of soil may be disinfected by soaking with a mixture of equal parts of kerosene and oil and then burning it.

Liquor cresolis compound, in 3 to 5% solution, generally is effective on the interiors of buildings and on corral fences and feedracks and for soaking grooming equipment. It may be applied for short periods to leather with satisfactory results.

Lewis lye, one can (13 ounces) to ten gallons of water, may be substituted for the cresol solution at a saving in cost. Both solutions, contrary to the usual rule, are as effective when cold as when hot.

Metaphen, zephiran, Tanexin, the flavines, etc., are widely useful where refined products are advantageous as in surgery. Iodine as the tincture, or as lugol's solution, is suitable for skin disinfection. Chlorine finds its principal use as a disinfectant for drinking water and for food containers.

IN THE PHILIPPINE ISLANDS

Whatever the disinfectant used, it must be applied liberally and must reach all the surface. In disinfecting buildings and fences, some force, as from a spray pump, to drive the solution into crevices is desirable. With cresol and lye solutions some lime may be used which, when dry, will reveal areas, if any, that have been missed by the disinfectant.

After disinfecting a building, the windows and doors should be opened. The sunlight and ventilation (drying) support the disinfectant and make the building more habitable.

Areas requiring disinfection are, of course, those that may transfer infection to susceptible animals. In the main they include the interior of stables in which infected animals are housed, corrals, picket lines, hitching posts, watering troughs, railway cars, in which diseased animals have been shipped, and stockyards, in which such animals have been confined.

Equipment liable to contamination from infected animals includes saddles, blankets, bridles, halters, harness, horse covers, and grooming kits.

Forage may be contaminated, and ordinarily it is better to destroy it than to attempt to disinfect it; forage and articles of small value may be destroyed on the certificate of the veterinary officer.

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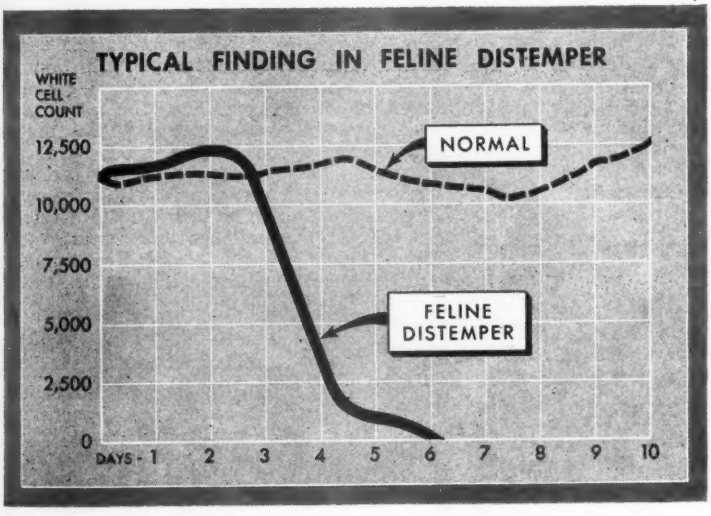

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You'll Be Interested to Know That . . .

It is expected that the wool production of the U. S. in 1941 will be about 400,000,000 pounds—a record clip.

■

During his first year of service, a British soldier requires for his clothing the wool from 26 sheep.

■

A poultry breeder in Australia, in order to introduce new blood into his white leghorn flock, ordered a consignment of 50 eggs of the same breed to be shipped to him by plane from Corvallis, Oregon. They were flown to San Francisco and transferred to the Clipper. When the eggs reached the consignee the cost was about $3.22 each.

■

Dr. Louis Klein, for many years director of clinical research for Hoffman-La Roche, and editor of the *Roche Review*, died at his home in Upper Montclair, N. J., October 24, at the age of 56 years. Scientists throughout the nation, who have benefited through Dr. Klein's research and from his writings, will regret his passing.

■

In August, 1941, there was an increase of 156% in liquid egg production over that of August, 1940, bringing that item to 11,238,000 pounds. This increase has been due in part to the demand during the year for large quantities of dried eggs. Probably the largest purchaser of the latter item was the United States Government, which from the first of the year up to the middle of September had bought 15,513,245 pounds of dried in addition to 66,189,090 pounds of frozen eggs.

■

The inexpensive bacteriological incubator described in the November issue (pages 567-568) has attracted much attention among practitioners. . . . One development has been that several veterinarians who have no time to build it themselves or who have found it difficult to obtain some of the materials because of national defense priorities, have asked the authors of the article to construct an incubator for them. The junior author and designer of the device, L. F. Jennings, has philosophically laid in a supply of materials to take care of the demand. He has already built some two dozen for practitioners in Michigan and elsewhere. . . . Mr. Jennings is a senior student at Michigan State College. His address is 114 Linden Street East Lansing, Mich. Inquiries about the incubator should be sent direct to him rather than to this office.

Applying knowledge of vitamins and balanced diets to animal rations is credited with prolonging many animal lives in zoos.—*S. N. L.*

■

General Smuts has sent President Roosevelt a personal gift of various types of grass which have been used successfully in South Africa for the reclamation of waste land. They have been tried under similar conditions to those which prevail in the American "Dust-Bowl," and it is hoped that they will prove useful for reclamation attempts there.—*Veterinary Record.*

■

A report just issued by the Bureau of Animal Industry credits Minnesota with leading all other states in the number of cattle tested for Bang's disease during the period from July 1, 1941, to July 1, 1942. In that time 571,387 head from 38,543 herds were given the test. Wisconsin ranked second with a reported 438,334 animals tested. The area test plan which was so successful in Minnesota in eliminating tuberculosis from the state, is being carried out in 22 of its counties.

■

C. H. Clark, State Veterinarian of Michigan, in a recent article in *The Prairie Farmer* quotes the law of that state regarding the sale and use of hog cholera serum. . . . It is unlawful to use serum from manufacturing plants other than those licensed by the federal Bureau of Animal Industry. The serum may be used by any competent person, but the use of virus in the state is restricted to regularly qualified veterinarians approved by the commissioner of agriculture or the state veterinarian. . . . Vaccination with serum alone, he adds, is usually unsatisfactory; the immunity conferred lasts not longer than three weeks.

■

Death from anthrax of 15 animals at the Herman Park Zoo in Houston, Texas, and the hospitalization of a zoo-keeper and a small boy, have led to the order by the city health director that all zoo employees must submit to vaccination with anti-anthrax serum.

All the meat-eating animals and all animals in the cages close to the infected animals have been vaccinated.

The animals which have died from the quick ravages of the disease include three mountain lions, three honey bears, one each badger, leopard, tiger, fox, owl, jaguar, civit cat, bobcat, and Longhorn steer.

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You'll Be Interested to Know That . . .

E. B. Hart, of the Wisconsin Experiment Station, has been awarded $1000 for outstanding research in dairy production.

■

That the two types of keratitis, one of which is infectious and due to a causal bacterium, and the other due to deficiency of vitamin A, are responsible for as high as 32% reduction in milk yield, as well as a lowered meat production, is the opinion of Dr. Vilo T. Rose of Elkton, Ky.

■

D. H. Hicks, chief veterinarian for the State Department of Agriculture of Oklahoma, warns against turning a herd of cattle on second-growth cane. He suggests picking out the scrawniest cow in the herd to use as a guinea pig. If she shows no ill effects, the rest of the herd can safely be turned into the field.

■

N. Kenneth Jensen implanted sulfanilamide crystals in the wounds of 126 injured persons suffering from infected compound fractures. Not a single case of gas gangrene and but four wound infections developed. In cases having otherwise the same treatment but no sulfanilamide, gangrene occurred in 7.3% and wound infections in 27% of the cases.

■

C. H. Herrick, University of Wisconsin, early in October reported to the American Academy of Science a method of immunizing chicks against coccidiosis by feeding them oocysts of the parasite treated by x-ray. Day-old chicks fed the treated oocysts were made resistant to the disease without bad effects on their growth or development, such as may result from sulphur treatment.

■

Ralph Waldo Emerson once wrote, "Disasters of all kinds prove benefactors." Out of the tragic mortality of the influenza epidemic of 1918 grew the comprehensive Red Cross program of training in home nursing. As a result of this training there have since been far more lives saved than were lost in that epidemic.

Even the war now raging has given a tremendous impetus to health and safety education. In particular, it has created a universal interest in blood transfusion. This interest has asserted itself through revolutionary developments in the preparation of blood for and in the technic of transfusion.

Roger J. Williams, University of Texas, has announced the eighth member of the vitamin B group. It is called folic acid because it is found abundantly in leaves. It is present also in all animal tissue.

■

The *Pacific Rural Press* (San Francisco) says, "Most of the things we know about human diets come from the livestock pens and laboratories and most of our progress in treating human ailments is based on animal experimentation."

■

Frank E. Moore, chairman of the department of poultry husbandry and extension poultryman of the North Dakota Agricultural College, has been appointed poultry coordinator to assist in the administration of the National Poultry Improvement Plan.

■

Walter H. Martin, who has practiced in El Reno, Okla., for 36 years, has completed a new veterinary hospital with modern equipment throughout. Doctor Martin has both a large and small animal practice and in addition conducts Martin's Veterinary Supply Co. He was secretary for the state board of veterinary medical examiners for ten years and milk inspector of El Reno for eight years.

■

Earle F. Schofield, Greenwich, Conn., has been returned to an office he held continuously from 1908 until three years ago—that of food and dairy inspector for Greenwich. In the early days of Doctor Schofield's incumbency the inspection of milk was in the pioneer stage, and the job of milk inspector was an arduous one, carried out in the face of much opposition to restrictions and regulations.

■

An Advisory Committee of the Animal Pathology and Hygiene Department of the University of Illinois, appointed by the Board of Trustees, held its first meeting September 15th. This committee will advise representatives of the Department with respect to studies on animal diseases. . . . Three members of the committee are practitioners. They are Drs. C. Vanderwarf, Chicago Heights; C. E. Dille, Cairo; and J. G. Blum, Normal. The other two members are cattle breeders. . . . The Department is also cooperating with the state Department of Agriculture in maintaining a diagnostic service for the farmers and the veterinarians of the state.

Emergency makes vaccination urgent against . . .

ENCEPHALOMYELITIS

AN ENCEPHALOMYELITIS EPIZOOTIC in 1942 would be a *national catastrophe.*

Never before in the history of our country has the preservation of our national resources been more imperative.

Motorized equipment has been restricted; horse costs have practically doubled.

Not in several decades has the horse occupied such an important economic position in our agriculture and transportation facilities.

A patriotic duty demands that every animal in previously infected areas, as well as approximating territories, be protected.

Lederle Laboratories developed and made *available* the first effective vaccine by which such an epizootic could be prevented.

As an added precaution against protection failures for the critical 1942 season, Lederle Laboratories is now distributing a vaccine having double the antigenic value previously available.

PACKAGES: "Encephalomyelitis Vaccine (Chick-Embryo Origin) *Lederle*"
For Intradermic Use
2—1 cc. vials (1 immunization) Eastern Type
10—1 cc. vials (5 immunizations) Eastern Type
2—1 cc. vials (1 immunization) Western Type
10—1 cc. vials (5 immunizations) Western Type

LEDERLE LABORATORIES, INC.
30 ROCKEFELLER PLAZA NEW YORK, N. Y.

You'll Be Interested to Know That . . .

Census of New York state farms shows that nearly 70%, or 168,804 are lighted by electricity.

■

The legend to a reproduction of the title page of Jenner's paper on vaccination published in 1798 reads: "The application of the facts presented in this paper has probably saved more lives than the total of all lives lost in war."

■

One of the outstanding difficulties in the study of typhus fever has been the lack of an animal in which the disease could be reproduced as it occurs in man. . . . Research men of the Rockefeller Foundation have found that the eastern cotton rat, although not an ideal subject, is much more suitable than the guinea pig for the investigation of typhus problems.

■

During the year ending October 1, 1941, a Guernsey cow of the St. Albens farms at Becker, Mo., produced more than 8½ tons of milk testing 4.95% butterfat. But an Ayrshire, Penshurst Charming Elma, holds the world's Ayrshire record, having produced through a span of 10 years, three months and 10 days; 5,000 pounds of butterfat.—*Hoard's Dairyman.*

■

Among other prolific crops of 1942 should be mentioned the attractive calendars issued by commercial supply houses and other organizations. . . . Distinctive among them is the one from the Toronto Humane Society. The theme is "Animals in War," and the excellent photographs embellishing each page include action pictures of army mascots, of animals (horses, dogs, camels) being used in warfare or in civilian war work, and one of a horse receiving treatment for battle wounds.

■

The Illinois Veterinary Medical Association this year continued its tradition of original notices for its annual banquet January 22 by sending members a "prescription," duly enclosed in a gelatin capsule. The ingredients, printed on a long strip rolled up inside the capsule, included all the attractions to be found at the banquet. . . . Not so original, but decidedly worthwhile, was a well-worded news release enclosed with the letter announcing the scientific program, to be filled in with the recipient's name and handed to his local newspaper.

J. A. Henderson has resigned his position in the Department of Animal Pathology and Hygiene, University of Illinois, to join the Royal Canadian Air Corps.

■

Dr. T. Dalling, professor of animal pathology at the University of Cambridge, has just retired to become director of the Veterinary Laboratories of the British Ministry of Agriculture at Weybridge.

■

W. G. Love, of the School of Veterinary Medicine, University of Pennsylvania, has accepted a position in the pathology department of the Federal Bureau of Animal Industry at Beltsville, Maryland. Arthur H. Craige, of the same school, has gone to the staff of Allied Laboratories.

■

According to figures from the Surgeon General's office regarding the death rate in the United States Army, deaths due to battle injuries increased from 15 per thousand for the Mexican War through 33 for the Civil War to 53 for World War I. The death rate due to disease, however, decreased from 110 through 65 to 19, respectively. The net result is that the total death rate in the Army declined from 125 per thousand in he Mexican War through 98 in the Civil War to 72 in World War I.

■

Re-Use of Baling Wire Saves Metal

Farmers, dairymen, stockyard operators and livestock producers have been requested by the U. S. Department of Agriculture to make special efforts to conserve bale ties (baling wire).

The Department estimates that farmers will need between 90,000 and 100,000 tons of 14 and 15-gauge wire for baling hay, straw and other forage crops in 1942. This is equivalent in weight to about three modern battleships, or three thousand medium tanks. Farmers can make a direct contribution to the war effort and also protect themselves from possible shortages by conserving these ties.

When bale ties are removed from a bale, either (a) carefully remove the tie without cutting it and straighten the bent end for use, or (b) cut bale ties as close to the loop as possible, leaving most of the wire-tie for use again, or (c) when baling, splice pieces of the wire bale ties which are too short for second use. Short ties may be used by making smaller and lighter bales. To prevent rusting wipe the ties with oil. They should be stored in a dry place.

Healthy Hogs are more profitable– Guard Against...

SWINE ERYSIPELAS

"ERYSIPELOTHRIX RHUSIOPATHIAE VACCINE *Lederle*," for use simultaneously with Anti-Swine Erysipelas Serum, is now made available to the veterinarians of many states, through the cooperation of their state Bureau of Animal Industry.

Lederle Laboratories have been supplying this vaccine to certain European countries for many years, and as experienced producers are in a favorable position to supply you with an active, viable, product.

Lederle being the first commercial producers of Anti-Swine Erysipelas Serum in the United States, you may be assured of achieving good therapeutic results with Lederle serum.

Make application to your state veterinarian for a vaccine permit.
Place your order through the nearest Lederle office.

PACKAGES:

Erysipelothrix Rhusiopathiae Vaccine *Lederle*—15 cc.
Anti-Swine Erysipelas Serum *Lederle*—100 cc., 250 cc.

LEDERLE LABORATORIES, INC.
30 ROCKEFELLER PLAZA NEW YORK, N.Y.

You'll Be Interested to Know That . . . .

Hard-boiled officials say, in truth, there is a reliable substitute for rubber. It is made of leather and fits on the bottom of any shoe.—*Roger Babson*

■

Ammonium sulfamate is being used in the making of fire-resistant fabrics. It is an especially good protection against fire from incendiary bombs.

■

A fine of $200 was levied against a Salem, New Jersey, cattle dealer when found guilty of importing animals into the state without first securing health certificates, or a permit allowing transportation of beef cattle for immediate slaughter. The dealer was apprehended through the activities of the Bureau of Animal Industry (New Jersey) of which R. A. Hendershott is chief.

■

The Hawaiian Red Cross quickly responded when help was needed after Pearl Harbor. Their well-trained Motor Corps carried out the evacuation of citizens from the bombed areas. Intensive training courses had been conducted earlier and 2,200 men and women, doctors and nurses were ready to respond to "alert." Twelve 50-bed first aid stations equipped with doctors, nurses and first aid personnel were immediately set up to care for the injured.

In Manila before it was attacked 40 settlements had already been designated as Red Cross evacuation and shelter areas, on the basis of available water supply, sanitary and housing facilities, etc.; thus providing for a refugee population of from 1000 to 10,000.

An agreement between the Red Cross and the C.C.C. calls for immediate training of key C.C.C. personnel in Red Cross disaster-fighting technic and for the use of the C.C.C. facilities as Red Cross evacuation centers—the equipment of the C.C.C. to be available for transporting, feeding and caring for evacuees.—*Red Cross News Service*

■

Hard coal-tar pitch, granulated or flakes, will extinguish a magnesium incendiary bomb by forming an airtight blanket which smothers the flame. The pitch will soften and cover the burning bomb at 400° F. The Director of the U. S. Bureau of Mines suggests that 25 to 50 pound lots of coal-tar pitch be stored in available places with a long handled shovel nearby.

In the pampas, where Argentina's most fertile soil is found, beef cattle are fattened entirely on native grasses and alfalfa. This practice is unheard of in America.—*Agri. in the Americas.*

■

The Military Insignia of Rank

The Army comprises arms and services, the former includes infantry, cavalry, artillery, combat engineers, etc.; the latter encompasses the medical department, chaplain's corps, etc. Officers of the line are frequently spoken of as "line officers."

The insignia worn on each shoulder strap by officers of the various grades are:

General: Four silver stars.
Lieutenant General: Three silver stars.
Major General: Two silver stars.
Brigadier General: One silver star.
Colonel: A silver eagle.
Lieutenant Colonel: A silver leaf.
Major: A gold leaf.
Captain: Two silver bars.
First Lieutenant: One silver bar.
Second Lieutenant: One gold bar.

At present there are only two active generals. General George C. Marshall, Chief of Staff of the War Department, and General Douglas Mac Arthur, of Philippine fame. John J. Pershing is also a general, but is retired.

A lieutenant general normally commands an army corps, a major general a division, a brigadier general a brigade, a colonel a regiment, a captain a company (infantry), a troop (cavalry), or a battery (artillery) and a lieutenant a platoon.

The rank of non-commissioned officers is indicated by chevrons on the sleeve. Two inverted "V" stripes for a corporal; three for a sergeant; connected at the bottom by a single curved stripe for a staff sergeant, two stripes for a technical sergeant and three for a master sergeant.

Insignia worn on collar (left) and lapels indicating the branch of the military service are: Infantry, crossed rifles. Cavalry, crossed sabers. Artillery, crossed cannons. Medical Department, caduceus (with a superimposed "A" for medical administrative corps, "D" for dental corps and "V" for veterinary corps). Air Service, wings, etc.

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You'll Be Interested to Know That....

There are 1,500 British veterinarians active in the A.R.P. for Animals Committee.

■

Although China now has no zoological gardens or parks, it is said to have had great zoological parks for many centuries following 1150 B.C.

■

Railroads serve at least 25,000,000 meals per year and they use 15,000,000 pounds of meat. Hotels and other public eating places use one-fifth of the products of the meat packing industries.

■

The pasture grass which has produced the most beef, according to recent tests of the College of Agriculture of the University of Illinois, is a mixture of half brome grass and half bluegrass. The next best forage was a mixture mostly of bluegrass with some clover and timothy.—*Country Gentleman.*

■

Horsemen object to the picture of the pony which adorns the postage stamp issued to commemorate the 80th anniversary of the Pony Express. They say the saddle is of the wrong era, the saddle bag missing, the reins looser than the artist's imagination and, according to the American Museum of Natural History, no horse in full gallop could hold its front limbs flexed while the hind legs are fully extended.

■

Since 1924 cotton saturated with carbon tetrachloride has been used to ease pruritus caused by mosquito and other insect bites. It is now found that chloroform is more beneficial, on the basis of tests made with the red bug, *Trombicula sp.*, the mosquitoes *Culex fatigans* and *Aedes aegypti*, the prevalent black fly, *Simulium quadrivittatum*, and the gnat, *Culicoides furens*. The treatment should be given as soon as possible, care being taken that the chloroform does not get into the eyes or on the mucous membranes.—*W. A. Hoffman, School of Tropical Medicine, Puerto Rico.*

Posterior paralysis in swine is sometimes due to leucemia.

■

Federal indemnity is available for cattle condemned for Johne's disease.

■

That goiter usually attacked people living inland was realized by the Chinese 4,000 years ago. They used seaweed and other sea medicines, many of which contain iodine.

■

At the end of the fiscal year 1941 there were 1,935 veterinarians employed in the Bureau of Animal Industry. Of these, 205 were doing tick eradication work.

■

Of the more than 5,800,000 big-game animals in the United States 60% are on state preserves and private refuges, according to a report the Fish and Wildlife Service made to the Secretary of the Interior.

■

It is unlawful, and unprofessional as well, in the practice of veterinary medicine to treat animals cruelly or to cause them unnecessary pain, hardship or suffering, or to permit extreme pain or great suffering to continue when it can be relieved without jeopardizing the chance of recovery.

■

Major Paul Salvi of Vienna rode on one horse from Budapest to Paris, a distance of 1,800 kilometers (1,120 miles) in 13 days, an average of 86 miles per day. The following year (1878) he rode from Bergamo to Naples, 685 miles, (crossing the Alps) in seven days making 98 miles per day. A year later he traveled from farm to farm in Spain and Portugal, a distance of 7,500 miles, in 182 days with an average of 40 miles a day. In all this time he rode the same horse which finished each of these long trips in better shape than when he started.—*Nat'l Horseman.*

No fear of Rabies here

Rabies may be controlled by systematic vaccination of the dog—

RABIES VACCINE

Lederle

THERE no longer exists any controversy among investigators and students of rabies concerning the value of canine rabies prophylactic vaccination.

Two main facts are responsible for the renewed support:

1 Compulsory animal protection tests requiring all vaccine to demonstrate a minimum immunizing value before it may be distributed. Thus, all poor or inferior vaccines are withheld from the market.

2 Facts reaffirmed and established as a result of well-controlled studies conducted by certain qualified, unbiased investigators upon a sufficiently large number of animals (dogs), which demonstrate the high degree of protection induced by vaccination.

Lederle Laboratories, Inc., welcome inquiries concerning the latest information available on "Canine Rabies Vaccine, Lederle*" and its effectiveness.*

Specify **Lederle**

PACKAGES:

RABIES VACCINE (Equine Origin)
Lederle

Phenol killed. (A 20% suspension of tissue virus.) For active immunization against rabies in dogs.

1—5 cc. vial
6—5 cc. vials
50 cc. vial (10 doses)

RABIES VACCINE (Ovine Origin)
Lederle

Chloroform killed. (A 33% suspension of tissue virus.) For active immunization against rabies in dogs.

1 dose (5 cc. vial)
6 doses (6—5 cc. vials)
10 doses (50 cc. vial)

(*Vaccination tag and certificate with each package.*)

LEDERLE LABORATORIES, INC.
30 ROCKEFELLER PLAZA NEW YORK, N. Y.

You'll Be Interested to Know That . . .

S. O. Fladness, Washington, D. C., chief of the Field Inspection of the Bureau, has returned from his mission to South America.

■

The Society of Women Veterinary Surgeons has been admitted to membership in the National Veterinary Medical Association of Great Britain and Ireland.

■

Jas. F. Harr, assistant livestock pathologist of the Division of Animal Husbandry's Los Angeles laboratory, has been promoted to Poultry Disease Specialist in the Sacramento offices of the State Department of Agriculture.

■

An oil portrait of Wm. E. Cotton was recently presented to the college by the veterinary students of Alabama Polytechnic Institute. Doctor Cotton is noted for his development of strain No. 19, which has been almost universally advocated and adopted in brucellosis control.

■

At the annual dinner of the Cornell Veterinary Alumni Association a portrait of Howard J. Milks was presented to the university. There were more than 200 contributions from alumni. Doctor Milks', "Practical Veterinary Pharmacology, Materia Medica, and Therapeutics," is in its third edition.

■

Pioneer Veterinarian Retires

Charles E. Cotton, D.V.M., pioneer the bovine tuberculosis campaign, has retired after twenty-two years as executive officer and secretary of the Minnesota State Livestock Sanitary Board. The first tuberculin testing of cattle in Minnesota in 1894 is attributed to Dr. Cotton. In 1903 when the state livestock sanitary board was established, Dr. Cotton was named a member and in 1918 was chosen head of the board.—*Jnl. A.M.A.*

■

Gaines Appoints New Sales Manager

That John Guter, Gaines Food Co.'s first salesman, is now Sales Manager has been announced by W. E. Armstrong, Vice President in Charge of Sales. He assumed his new duties at the same time that the Gaines "Keep 'Em Fed Right" campaign became nationwide, so has been an extremely busy man.

Mr. Guter held the intra-mural boxing championship for four years and played Varsity LaCrosse for three years while at Colgate University from which he was graduated.

The late Doctor Roberts of the Dominican Republic found more mineral than vitamin deficiencies in live stock in the tropics.

■

Wilfred McKeon, president of Sulpho Dip, expresses wonder at the "wide range of pulling power" of the advertising section of VETERINARY MEDICINE, as he has just shipped a large order, due to his ad, to Peru. That's just routine, "Mac."

■

P. P. Levine is the new editor of the Cornell Veterinarian. Doctor Levine, assistant professor of pathology and bacteriology at Cornell, devotes most of his time to research in poultry diseases. He is the author of many scientific papers.

■

Denny Hammond Udall, author of many well known treatises on veterinary subjects, has been retired from the faculty of Cornell Veterinary College after 40 years of service under five deans and four presidents. Doctor Udall's book, "The Practice of Veterinary Medicine," has reached a third edition .

■

C. K. Mingle, a member of the staff at the Animal Disease Station, Beltsville, Md., has flown to England to assist veterinarians of the British Ministry of Agriculture in the production of Br. abortus vaccine in accordance with plans adopted during Dr. Eichhorn's visit to England last fall.

■

Upon the organization of the Ceylon Veterinary Association, in July, 1940, one of the first questions that engaged attention was the problem of rabies. They passed a resolution requesting that in view of the serious outbreak of rabies in Colombo, that that city introduce immediate compulsory inoculation of all dogs and they urged that treatment be given free so as to get full cooperation of the public.

■

Sixty-six veterinarians from 22 counties attended a poultry clinic and meeting at the Doctor Spencer's animal hospital in Cedar Rapids, Iowa, the evening of April 9. The large attendance was indicative of the interest of the veterinary practitioners in the war effort toward increased production by the poultry industry of Iowa.

Doctor Menary, Cedar Rapids, presided and C. C. Franks, State Veterinarian of Iowa, outlined measures for war-time control and eradication of infective diseases of livestock and poultry.

New products for the Small Animal Practitioner

ANTILEPTOSPIRA SERUM
and
LEPTOSPIRA DIAGNOSTIC ANTIGEN
Lederle

NATION-WIDE current interest in Leptospira infection in man (Weil's disease) and animal (Stuttgart's disease) has shown it to have more frequent occurrence than previously supposed.

"Leptospira Diagnostic Antigen *Lederle*" will aid you in your doubtful diagnosis.

"Antileptospira Serum *Lederle*" will give you the long hoped for curative and protective results, when you have established the diagnosis.

ANTI-FELINE DISTEMPER SERUM
and
FELINE DISTEMPER VACCINE
Lederle

RECENT INVESTIGATIONS have established that feline distemper is a specific blood disease caused by a high grade lethal virus, with a marked leucopenia as a constant symptom.

"Feline Distemper Vaccine *Lederle*" is a killed tissue virus suspension prepared from diseased kitten spleens. Unexposed kittens or adult animals receiving this vaccine are rendered immune to future exposure.

"Anti-Feline Distemper Serum *Lederle*" (homologous) is prepared from cats which have been hyperimmunized with feline distemper virus.

The high antiviral properties of this hyperimmune serum have been demonstrated experimentally and clinically under field conditions.

Specify ***Lederle***

LEDERLE LABORATORIES, INC.
30 ROCKEFELLER PLAZA NEW YORK, N. Y.

You'll Be Interested to Know That . . .

Vitamin A in fish tissue can be traced by means of ultraviolet light.

■

Forty bushels of grain can be made to produce as much industrial alcohol as one ton of raw sugar.

■

Abbott Painting Goes to Government

The Abbott Laboratories, North Chicago, Illinois, have announced that the painting which is reproduced above and was used on the cover of the May issue of their publication, "What's New," has been presented to the Government for use by the Treasury Department.

This painting by Lawrence Beall Smith, will be widely distributed by the Treasury Department within a short time. In addition, Abbott is having reproductions made, which will be sent upon request to interested physicians and veterinarians. Readers who wish reproductions to post in their offices are invited to write Abbott Laboratories for copies.

A sculpture of "Man O' War" is used in an exhibit in the Field Museum (Chicago)—not to feature his accomplishment on the turf, but to illustrate the final step in the evolution of the horse.

■

Limited licenses for the commercial production of vaccine for swine erysipelas, have been issued, according to an announcement of May 18 of the U. S. Department of Agriculture. Commercial biologic firms will distribute the vaccine under rigid regulations. Immunization records and results are to be kept on every herd and reported to the U. S. Department of Agriculture.

■

Research Again Demonstrates Its Dollar Value

Although research in industry has demonstrated its value numberless times in enabling manufacturers and others to meet changing conditions it has seldom been more pointedly demonstrated than occurred when manufacturers of canned dog food were suddenly confronted with an order restricting the use of tin. Here was an industry that had grown in a score of years from nothing to an annual distribution of 700 million pounds. Its discontinuance would have meant inconvenience in hundreds of thousands of homes and more serious effects on manufacturers and their employees, distributors and others deriving all or a part of their livelihood from the canned dog food industry.

It would have been a simple matter to dehydrate the product and market it in cartons, with instructions to the owner to add water when it was fed but that was not the answer. Texture, odor and palatability had to be considered if the dried product was to take the place of the canned food, and the vita-content must be preserved from oxidation or other loss if the food was to retain its adequacy. It required months and even years of study to accomplish dehydration without other change than removal of the moisture. Fortunately these problems had already been solved by painstaking research and before the prohibitions on the use of tin for dog food cans became fully effective Wilson, Swift and Morrell were able to supply dehydrated substitutes for "Ideal," "Pard" and "Red Heart" that in addition to supplying a product that can be reconstituted by the simple addition of water, save tonnage when our transportation is seriously overloaded by the War effort and conserve meat by-products for which there is little demand for human food.

Hog prices have now reached the highest level in sixteen years (since 1926)

ANTI-SWINE ERYSIPELAS SERUM
and
CULTURE VACCINE
Lederle

SWINE ERYSIPELAS is a rapidly growing menace to the swine industry, second only to hog cholera.

"Anti-Swine Erysipelas Serum *Lederle*" was the first serum made available to the veterinary profession to combat this disease in the United States.

Lederle Laboratories' production program has been set up to provide sufficient stock to care for the rapidly increased demand resulting from rising hog prices, increased hog population, and the increased disease incidence.

"Erysipelothrix Rhusiopathiae Vaccine *Lederle*" is also available to veterinarians holding permits to administer the product.

Specify Lederle

PACKAGES:
ANTI-SWINE ERYSIPELAS SERUM *Lederle*
50 cc. vial
100 cc. vial
250 cc. vial

ERYSIPELOTHRIX RHUSIOPATHIAE VACCINE *Lederle*
15 cc. vial

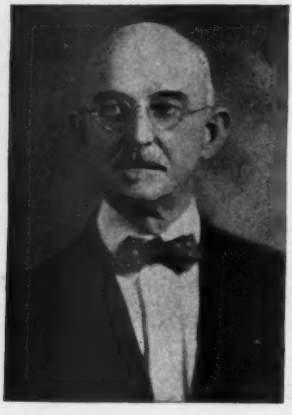
LEDERLE LABORATORIES, INC.
30 ROCKEFELLER PLAZA · NEW YORK, N. Y.

You'll Be Interested to Know That . . .

War Bonds and Stamps are not intended for "bait." They should not be "commercialized," i.e., offered as premiums in combination with merchandise, or as prizes in lotteries, or used in any manner that involves personal profit, directly or indirectly.

Any persons or organizations interested in plans for the distribution of War Bonds and Stamps, are urged to check with their local Better Business Bureau or with the U. S. Treasury Department to make sure that such plans meet the considerations of public policy and good taste. This announcement has just been made by the Magazine Division War Savings Staff U. S. Treasury Department.

H. W. Young, Elected president of the Missouri Veterinary Medical Association



T. A. Sigler, President-elect of the National Practitioners' Association

J. C. Flynn, Reelected secretary-treasurer of National Practitioners' Association

The Midwest Veterinary Conference, held in Kansas City, Mo., June 29-July 1, was attended by representatives from 16 states. There were more than 275 veterinarians registered and all were enthusiastic over the splendid program.

This conference was sponsored by the Kansas, Missouri and National Practitioners' Veterinary Medical Associations. Both the Practitioners' and the Missouri Associations held their annual elections during the meeting. T. A. Sigler, Greencastle, Indiana, was elected president; A. F. McGreevy, Sioux City, Iowa, 1st vice-president and S. E. Hershey, Charleston, West Virginia, 2nd vice-president of the Practitioners' Association. J. C. Flynn, Kansas City, was reelected secretary-treasurer. George A. Hawthorne, Clarinda, Iowa and J. E. Weinman, Lincoln, Nebraska, were elected directors for four and five years, respectively.

Harvey W. Young, Kansas City, retiring president of the National Practitioners' Association, was elected president of the Missouri Veterinary Medical Association; George F. Jungerman, Aurora, was named vice-president and John L. Wells, Kansas City, secretary-treasurer. Kirtley Sears, Maryville, was elected trustee of District I.

H. F. Dotson, Wichita, is president; J. W. Lumb, Manhattan, vice-president and Chas. W. Bower, Topeka, secretary of the Kansas Veterinary Medical Association.

■

The Red Star Animal Relief has issued a small pamphlet giving directions for handling animals during and following air raids. It may be obtained (free) from The American Humane Association, 135 Washington Ave., Albany, N. Y.

■

The destruction caused by rats costs the United States more than $200,000,000 annually. In addition to this tremendous loss the rat is a grave menace as it may spread Bubonic plague, typhus fever, infectious jaundice, rat-bite fever and cause food poisoning. The anti-rat measures include three objectives —starve them out, build them out or kill them.

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SWINE ERYSIPELAS is a rapidly growing menace to the swine industry, second only to hog cholera.

"Anti-Swine Erysipelas Serum *Lederle*" was the first serum made available to the veterinary profession to combat this disease in the United States.

Lederle Laboratories' production program has been set up to provide sufficient stock to care for the rapidly increased demand resulting from rising hog prices, increased hog population, and the increased disease incidence.

"Erysipelothrix Rhusiopathiae Vaccine *Lederle*" is also available to veterinarians holding permits to administer the product.

Specify Lederle

PACKAGES:
ANTI-SWINE ERYSIPELAS SERUM *Lederle*
50 cc. vial
100 cc. vial
250 cc. vial
ERYSIPELOTHRIX RHUSIOPATHIAE VACCINE *Lederle*
15 cc. vial

LEDERLE LABORATORIES, INC.
30 ROCKEFELLER PLAZA NEW YORK, N. Y.

You'll Be Interested to Know That . . . .

Litters from sows deficient in *vitamin A* have a high percentage of pigs with harelips, cleft palates, and similar defects.—S. N. L.

■

After 40 years with Ralston Purina Co., St. Louis, Mo., W. K. Woods, senior vice-president has recently retired.

■

Volatile chemicals which give out a fragrant aroma, are used for deodorizing in the lion house of the New York Zoo.

■

Dr. Lawrence T. Clark, managing director of The Research and Biological Laboratories of Parke, Davis and Company, died May 29, aged 61 years. Doctor Clark's entire scientific career was with this company which he joined soon after his graduation from Michigan State College in 1904.

■

The Northern Research Laboratory of the U. S. Department of Agriculture at Peoria, Ill., has prepared an elastic material from soybean and corn oil which has one-third the stretch and one-sixth the tensile strength of natural rubber. It can be used to relieve the rubber shortage for waterproofing, resistance to abrasion, cracking, etc.

■

During air raids in England, veterinarians have found it hard to get about and carry on because they were constantly questioned by the police. Many of them now attach a notice "Veterinary Surgeon" to their cars and thus find themselves free to go about their duties. The "V" in the placard is extra large to symbolize Victory. Many American veterinarians have long used a distinctive insignia on their cars.

■

C. K. Mingle, of the Animal Disease Station, B.A.I., Beltsville, Md., reported* some time ago to have flown to England to assist the British Ministry of Agriculture in the production of vaccine for brucellosis, has returned to the United States. Doctor Mingle protected the bacteriological culture which he was taking for the production of the vaccine, by keeping it close to his body under his sheepskin flying suit. The doctor reports that large quantities of the vaccine are already being made in England. It is administered under official veterinary control.

**Vet Med.*, June, 1942, p. XII.

Only 60% of all pigs littered ultimately reach the market to be used for food.

■

A 5% sulfathiazole ointment is highly regarded by some as an application for conjunctivitis.

■

The tactile sense in the horse reaches its highest development in the lips, which not only act as a prehensile organ, but are an important factor in the selection of plants and grains eaten or rejected by the animal.

■

During the rutting season the male camel is very savage, uttering a loud bubbling roar and fighting fiercely with its fellows.

The female produces one young at a birth, after 11 months' gestation. The mother suckles her offspring for a year and the latter does not reach maturity until its 16th or 17th year, living until it is 40 or 50.—*Ency. Brit.*

■

Soldiers in Combat Areas to Carry Sulfanilamide Tablets

The War Department announced a short time ago that every American soldier who goes into a theater of operations will be equipped with twelve sulfanilamide tablets, in a special spill proof metal box, as a standard addition to the first aid equipment of all troops in combat areas. Directions for use are printed on the back of the box.

■

The Quartermaster Corps of Chicago maintains a Subsistence Research Laboratory. Theirs is the task of developing new types of rations to meet new food needs created by modern warfare. Among these, in addition to frozen boneless beef and pork, are the parachute ration, which includes three separate meals in one pack (weighing 32.86 ounces and providing 3,725 calories) and an emergency field ration which contains a "pemmican" biscuit in which is incorporated practically all the essentials for a balanced diet.

All the meat and dairy products used in the improved rations must pass rigid inspection by a veterinary officer. The canned meats which are procured by the Quartermaster Corps for the armed forces are likewise inspected before being canned by veterinarians in the packing plants. Usually immense reserve stores of canned meats and other canned foodstuffs have been kept in the Philippines, Hawaii, Panama, Alaska and our other distant outposts.

Valuable NEW *therapeutic products . . .*

ANTI-FELINE DISTEMPER SERUM
and
ANTILEPTOSPIRA SERUM (Equine Origin)
Lederle

Unsuccessful treatment of feline distemper in cats and leptospirosis (Stuttgart's disease) in dogs has cost the veterinarian valuable customers and much ill will in the past.

Now these diseases can be successfully and profitably treated with these new Lederle products. The veterinarian will find Antileptospira Serum and Anti-Feline Distemper Serum valuable additions to his armamentarium.

2 NEW THERAPEUTIC AGENTS FOR USE IN THE TREATMENT OF SMALL ANIMAL DISEASES
● The introduction of two new therapeutic agents, "ANTILEPTOSPIRA SERUM (Bivalent) Equine Origin Lederle" and "ANTI-FELINE DISTEMPER SERUM (Homologous) Feline Origin Lederle", now makes it possible for the veterinarian to win new friends and clients, and to realize substantial profit from successful treatment of animals sick with diseases formerly having a high rate of mortality.

Lederle Laboratories also produce "Leptospira Antigen *Lederle*" for the rapid plate determination of significant agglutinins for Leptospira canicola and Leptospira icterohemorrhagiae, in clear serum; and "Feline Distemper Vaccine *Lederle*" for inducing a solid immunity against feline distemper in cats.

PACKAGES:

"ANTI-FELINE DISTEMPER SERUM *Lederle*"
10 cc. and 50 cc. vials

"FELINE DISTEMPER VACCINE *Lederle*"
2—2 cc. vials
10—2 cc. vials

"LEPTOSPIRA ANTIGEN *Lederle*"
1—5 cc. vial each—
Leptospira canicola
Leptospira icterohemorrhagiae
Bivalent Positive Serum
3—5 cc. dilution vials

"ANTILEPTOSPIRA SERUM (Equine Origin) *Lederle*"
50 and 100 cc. vials

Copies of the four-page letter illustrated above may be obtained upon request.

LEDERLE LABORATORIES, INC.
30 ROCKEFELLER PLAZA NEW YORK, N. Y.

You'll Be Interested to Know That . . .

The record of brucellosis tests in Maine for year ending June 30, 1942, show 15,939 herds tested with 5,854 reactors or 4% infection. During the same fiscal year 4,018 herds were tuberculin tested with .06% reactors.

■

Wild Turkeys Beneficial to Agriculture

The *Journal of Wildlife Management* reports that the diet of wild turkeys in the Ozark region is 25% grasshoppers, stinkbugs, beetles and ants—all harmful insects. The remaining 75% eaten by the turkeys includes grasses, grass seed and acorns as the principal elements.

■

A. C. Merrick, practitioner and research man of Brookfield, Illinois, has had prepared an interesting two-reel picture in which are shown microphotographs of the fungus spore which Doctor Merrick believes to be the cause of summer eczema in dogs. He reaches the conclusion through records of 1100 cases that of the affected dogs 95% is of fungus origin and 3% parasitic.

■

Instead of "milk-fed chickens" on menu listings we may read, "soybean-fed chickens" if the recommendations of the committee report of the National Research Council are adopted generally. Some such substitution is necessitated in lieu of dried milk of which most available supplies are being sent overseas for Army supplies and lend-lease shipments.

Soybean oilmeal, in addition to replacing the milk proteins, is also a good source of riboflavin—a vitamin of value in poultry feeding.

■

Charge To Be Made for Rabies Examination by Bureau of Animal Industry U. S. Department of Agriculture

Pursuant to the provisions of the Department of Agriculture Appropriation Act, 1943, effective immediately (August 13, 1942) the Bureau of Animal Industry will charge a fee for all diagnoses in connection with rabies, except those performed for agencies of the United States Government. The fee will be $5.00 when laboratory animal inoculations are made and $2.50 when only a microscopic examination is made. All fees collected for such services will be covered into the Treasury as miscellaneous receipts.

A note from G. W. Browning, Mobile, Ala., says: "I was graduated 50 years ago from the New York College of Veterinary Surgeons. I retired in 1933, but of late I have been sort of drafted into veterinary practice. I am 87 years old but still going strong and of course I need VETERINARY MEDICINE again."

Simian Artists in England

Doctor Julian Huxley, director of the London Zoo, reports that a young gorilla upon seeing his shadow cast by a strong electric light, stopped his play, looked at the shadow and then proceeded to trace its outline with a forefinger. He did this upon several occasions.

■

War Production Program Increases Fire Hazards

President Roosevelt has designated October 4-10 as Fire Prevention Week, and has directed the Office of Civilian Defense and other appropriate federal agencies to emphasize the importance of attaining the objectives of the annual campaign.

"Today," states the Presidential proclamation, "when every machine is being taxed to its fullest productive capacity, when new hands are working with unfamiliar tools, and when agents of our enemies are seeking to hinder us by every possible means, it is essential that destructive fire be brought under stricter control, in order that victory may be achieved at the earliest date."

The nation's material losses from fire in 1941 reached an estimated $303,895,000—an increase of $17,493,633 over the preceding year. The nation's tremendous war production drive has greatly increased the incidence of industrial fires, calling for redoubled efforts on the part of both workers and management.

★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

BRUCELLA ABORTUS VACCINE *Lederle*

Restricted consumption of meat and meat products is now a reality.

Every food-producing animal must be saved.

Sacrifice of cattle by the test and slaughter method should be discouraged.

Bang's Disease should be controlled by more economical methods—the use of Brucella Abortus Vaccine.

"Brucella Abortus Vaccine *Lederle*" represents

— high percentage of viable organisms;
— high viability represents antigenicity;
— high antigenicity represents immunity.

Specify ***Lederle***

PACKAGES:
"Brucella Abortus Vaccine *Lederle*"
1—6 cc. vial
10—6 cc. vials

LEDERLE LABORATORIES, INC., 30 Rockefeller Plaza, New York, N. Y.

You'll Be Interested to Know That . . .

Subscribe to the Red Cross Roll Call Nov. 11-26, 1942

The Geneva Red Cross Movement

The Geneva Red Cross movement is only about 80 years old. From the great and unnecessary human suffering and loss of life during the Crimean War and on the bloody field of Solferino came the impetus for the organization of the Sanitary Commission in the United States in 1861 and for the Geneva Convention in 1863. The two movements, which developed independently in the United States and in Europe, united in one great humanitarian activity at the international congress at Geneva in 1864. The ten articles agreed to at that congress between plenipotentiaries of twelve countries received the eventual adherence of forty additional ones, including the United States. In essence these articles provided for the neutrality of the personnel of the medical services of armed forces (this did not exist throughout most of the American Civil War), the humane treatment of the wounded, the neutrality of civilians who voluntarily assisted the wounded and an international emblem to mark medical personnel and matériel. The ten articles were later expanded by congresses at Geneva in 1906 and 1929 and have been ratified by practically all civilized governments. The Geneva Prisoners of War Convention, signed at Geneva on July 27, 1929, was never ratified by Japan, although it was agreed to by both Germany and Italy. However, on Dec. 18, 1941, the Department of State requested the Swiss government, through its representative at Tokyo, to transmit to the Japanese government the information that the United States government expected to adhere to the Geneva Prisoners of War Convention and the Geneva Red Cross Convention, both of July 27, 1929, and that the government of the United States hoped that the Japanese government would apply the provisions of the two conventions reciprocally. On Feb. 4, 1942, a telegram was received from the American legation at Berne to the effect that the Japanese government had informed the Swiss minister at Tokyo that, "first, Japan is strictly observing Geneva Red Cross Convention as a signatory state. Second. Although not bound by the convention relative treatment prisoners of war, Japan will apply mutatis mutandis provisions of that convention to American prisoners of war in its power."—*Jnl. A. M. A.*

A cow doesn't even have to eat *garlic* to get the flavor in her milk—she need only smell it steadily for 10 minutes, according to the Department of Agriculture.—*S. N. L.*

■

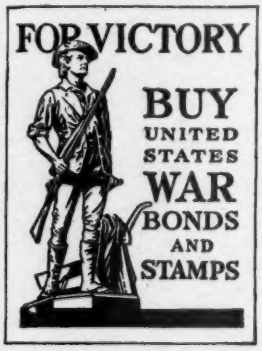
A report comes from the School of Tropical Medicine, San Juan, Puerto Rico, that the small ants which abound in the tropics and get into sugar and other foods, have been found capable of spreading dysentery by carrying the germs on their feet.

■

Preparedness

Flyers henceforth will carry in their pockets a package known as the "Bail-Out" ration. Weighing 8¼ ounces, it is intended for flyers who are required to parachute. It contains a vitaminized chocolate bar; a box of malted milk-dextrose tablets; a carton of dextrose tablets; a tube of bouillon powder, and a stick of gum. No beans.—*The Army Officer.*

■



C. I. Reed, Professor of Physiology, University of Illinois College of Medicine, warns that instructions which have been rather widely circulated to the effect that surgical rubber gloves should be used as a protection against mustard gas, are erroneous. In fact, since this gas is soluble in rubber, a small point of contact with the gas might spread over the whole glove, in time, and burn the entire covered surface. Doctor Reed, as an officer in the Chemical Warfare Service Experiment Station at American University in 1918, saw many serious cases resulting from dependence upon unjustified recommendation of these gloves as a protective measure.

Rubber is used in gas masks as a protection against war gases but it is an entirely different type of rubber—is much thicker and is not in direct contact with the skin.

Protected Delivery

Veterinarians are pleased with the oxytocic reliability of Pitocin.* It acts quickly to prevent or minimize hemorrhage after labor and to hasten the expulsion of the placenta.

Pitocin(alpha-hypophamine)contains the carefully standardized oxytocic principle of the pituitary gland with almost none of its pressor principle. Thus, it effectively stimulates the power and frequency of uterine contractions without raising the animal's blood pressure. Systemic reactions rarely follow its use.

*Trade Mark Reg. U. S. Pat. Off.

Pitocin

Made only by Parke, Davis & Company

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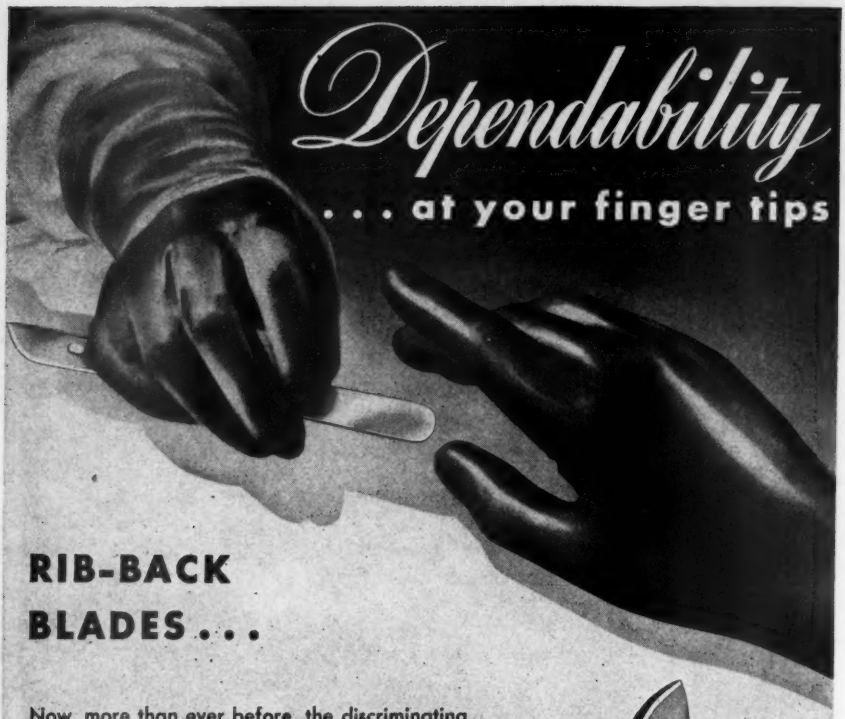

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Now, more than ever before, the discriminating surgeon appreciates the superior qualities that Rib-Back Blades afford. Their uniformly superior sharpness, adequate degree of rigidity, greater strength, place the finest surgical cutting edges ever produced at your constant service . . . dependability at your finger tips.

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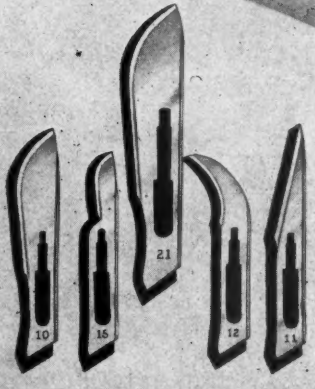

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DISTAL ENDS . . . redesigned for use in blunt dissection

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A BARD-PARKER PRODUCT

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Tyrothricin

VETERINARY

FOR THE TREATMENT OF CHRONIC BOVINE MASTITIS

Tyrothricin, a combination of gramicidin and tyrocidin, obtained from Bacillus brevis, has proved remarkably effective in the treatment of chronic bovine mastitis due to Streptococcus agalactiae.

Local instillation of aqueous or alcoholic tyrothricin preparations frequently produces intense irritation, swelling of the treated quarter, and a marked elevation of temperature. *Mulford* Tyrothricin, on the other hand, rarely exerts undesirable side-effects because the active principles are suspended in the aqueous phase of a bland, light mineral oil emulsion. When *Mulford* Tyrothricin is used it is possible to repeat treatment on the second and third day if desired.

Dosage: 20 cc., instilled aseptically into the milk cistern via the teat canal. Treatment may be given either during the lactating or non-lactating period.

MULFORD *TYROTHRICIN* VETERINARY is supplied as follows:
V 80-74. . . One 250-cc. bottle . . . . . $4.90 list
Subject to regular biological trade discount; cash discount, 2%.

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Fur Animal Practice

Because fur bearers are animals, the control of disease among them is veterinary medicine and a responsibility of the veterinary practitioner. Here is where the usefulness of "Fur Animal Practice" comes in. It contains just the special information to enable the general practitioner or the small animal practitioner to equip himself to handle the diseases of the fur bearers. It was prepared by Dr. E. J. Frick, who has long been engaged in the fur industry and has had an extensive experience in treating the diseases of fur bearing animals. Collaborating with Doctor Frick were 14 experts on the various fur bearers.

The subjects discussed include:
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The Field of Veterinary Service to Fur Farmers
What Fur Breeders Expect of the Veterinarian
Postmortem Technic and Observations
Restraint and Medication of Foxes
Government Research on Diseases of Fur Animals
Mink: Care, Handling and Common Diseases
Chinchillas—Past, Present, Future
What to Do with the Carcass
Common Sense in Fox Farming
Problems in Reproduction
Fox Encephalitis
Tenotomy in the Fox
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Basically unchanged, all the Pard health-building ingredients are present in New Pard. It provides the essential food elements, minerals, and vitamins that dogs must have for sound, vigorous condition. Only the moisture has been removed by scientific dehydration* to permit new packaging that saves tin. Simply add water before serving.

You will find New Pard economical to feed. 2 packages go just as far as 3 cans did—and no other food is normally needed. New Pard is tempting as ever to the canine appetite!

**An original Swift & Company process—patent applied for.*

New Pard looks like fresh ground food when water is added! New Pard is scientifically dehydrated—not baked or dried at high cooking temperatures.

Convenient for dog owners! Merely adding water makes New Pard complete. No stirring, no mixing, nothing else needed!

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● The ideal carbon disulfide capsule. Soft, elastic, thick-walled, bullet-shaped. Contains 2% aluminum stearate to make a jelly-like mass which, as in dry mass capsules, absorbs slowly in the stomach. Thus, Botcaps do not unduly inflame or irritate the gastric mucosa. And, if accidentally broken in the mouth during administration, no burning or other injury will result. Supplied in two sizes: 6 drams by volume, and 3 drams by volume.

Fort Dodge Laboratories, Inc., Fort Dodge, Iowa

MEMBER
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EARLY AND ACCURATE DIAGNOSIS

. . . . is essential to the success of the Squibb Mastitis-Control Program

How CHRONIC MASTITIS is being cured

1 By the veterinarian's early and accurate diagnosis.

2 By the dairyman's practice of a rigid Sanitation Control Program, day in and day out.

3 By treatment with Novoxil Liquid — a bactericidal and healing agent.

Veterinarians are playing a major part in helping to cure Chronic Mastitis, caused by Streptococcus agalactiae.

One of the most important steps in eliminating this disease from dairy herds is an early and accurate diagnosis by the veterinarian.

Following this diagnosis are the two important steps recommended by Squibb: (1) A rigid Sanitation Control Program with the segregation of infected cows, and (2) The use of Novoxil* Liquid, an active silver oxide, for treating infected cows. This program has proved highly successful in the majority of cases.

All inquiries from herd owners about Novoxil Liquid are referred to veterinarians. Those who are not familiar with Squibb's control program and Novoxil Liquid should fill in the coupon below. Check data you wish.

**Novoxil is a trademark of E. R. Squibb & Sons*

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MEANS TO MANKIND

Protecting Britain's Food Supplies

● Hugging a precious tube of bacteria under his sheepskin flying suit, that his body heat might help keep the organisms alive, a veterinarian, Dr. C. K. Mingle, of the U. S. Bureau of Animal Industry, flew to England through a blizzard in order that British cattle might be protected against the ravages of brucellosis. The bacteria he carried was the famous U.S.B.A.I. "strain 19," proved safe and effective for the production of bovine abortion vaccine.

That trip climaxed events set in motion by American veterinarians to protect the food supply of our allies. Previously, as a result of his survey of British live stock conditions, another Bureau veterinarian, Dr. A. Eichorn, had recommended that the vaccine be used on British cows. Later, when Britain needed a certain centrifuge to produce the vaccine, even one of these was flown to England—dramatically illustrating how the veterinary profession advances and protects civilization.

One of a series of advertisements on behalf of the Veterinary Profession published by

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A *Better* VACCINE

for the control of pneumonia and infectious enteritis

ALUMINUM HYDROXIDE ADSORBED

Cutter Pasteurella-Salmonella Cholerasuis Bacterin

CUTTER Pasteurella-Salmonella Cholerasuis Bacterin has been developed to give more specific action against pasteurellosis and salmonellosis. Because of its aluminum hydroxide adsorption it offers still greater effectiveness, for a single injection has the effect of repeated smaller doses of non-treated bacterins.

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★ ★ ★ BUY WAR SAVINGS STAMPS AND BONDS

A long extinct "grandfather" *fish* was the ancestor of all backboned animals, including man.

■

Dr. and Mrs. N. S. Mayo of Highland Park, Ill., will again spend the winter at the Villa Dora Hotel, Mt. Dora, Florida—a good place for bridge and tall stories.

■

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Packers in the dog food business, and other packers as well, will be interested in knowing that the contemplated meat rationing program of 2½ pounds per person does not include the family pooch as "a person." No rationing allowance will be made for household livestock. If they eat fresh meat it comes out of the owner's budget. The fact that the supply of meat for civilian use is below requirements and that all will be needed for human use is sufficient proof of the place of the dog food business in the industry. Employing wholesome products not suitable for human consumption, the industry seems destined to play an even more vital role in our domestic economy by making possible the maintenance of family pets in the face of restricted meat supplies. European dog lovers have not been so fortunate.—*Natl. Provisioner.*

For over a quarter of a century FISTONE has been a priceless friend to veterinarians having equine cases with chronic suppurative wounds that do not respond to topical application.

When an animal is "out of condition" from obscure focal infections of the internal organs FISTONE has proved invaluable.

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Dog Etiquette is a training book written in a new fascinating way. It's as interesting as a story . . . simple, practical, with every point illustrated. You'll enjoy glancing through it yourself. And you'll find it a big help in loaning to clients who need to know more about training their dogs. A complimentary copy of this stiff bound 64-page book is *yours for the asking*, Doctor! Simply fill out the coupon below.

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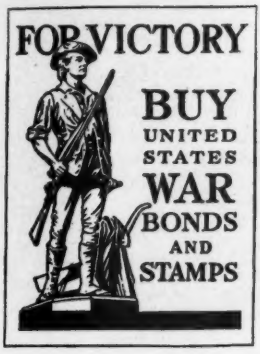

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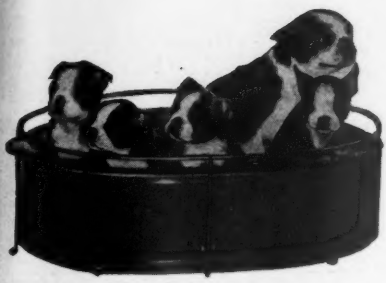

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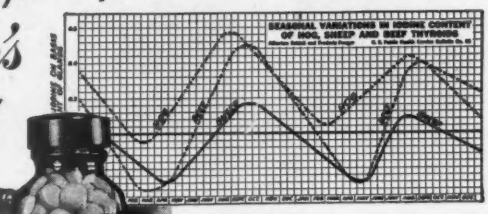

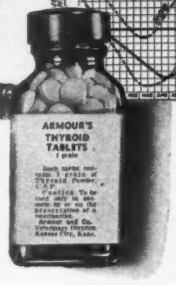

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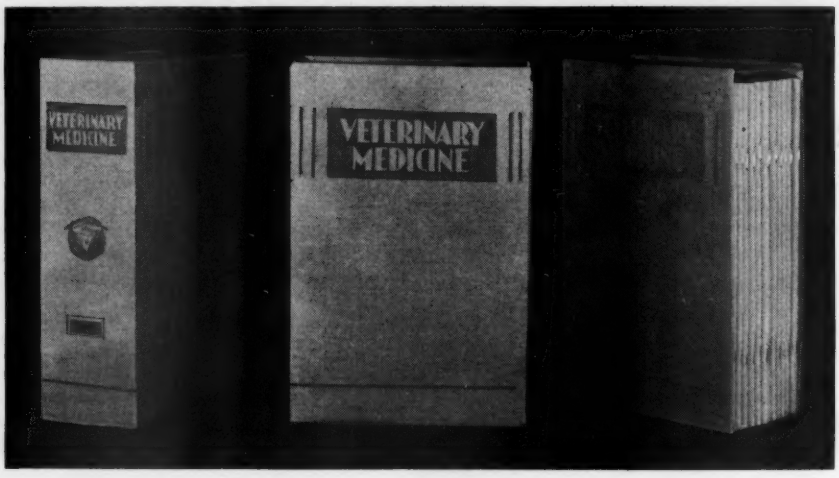

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Coming Meetings

American Society of Animal Production (35th Annual meeting, Chicago, Ill., November 27-29, A. D. Weber, Sec., Kansas State College, Manhattan, Kans.

National Assembly of Chief Livestock Sanitary Officials, Dec. 1, Hotel LaSalle, Chicago. R. A. Hendershott, Sec., Trenton, N. J.

United States Live Stock Sanitary Association, 46th Annual Meeting, December 2-4, LaSalle Hotel, Chicago, Ill. Mark Welsh, Sec., College Park, Md.

American Association for the Advancement of Science, Annual Meeting, December 28-January 2, 1943, New York, N. Y. Forest R. Moulton, Secy., Smithsonian Inst. Bldg., Washington, D. C.

Cornell Conference for Veterinarians, 35th Annual, January 6-8, 1943, N. Y. State Veterinary College, Ithaca, N. Y. W. A. Hagan, Dean, Cornell Univ., Ithaca, N. Y.

Kansas Veterinary Medical Association will hold its winter meeting January 11-12, Manhattan. Chas. W. Bower, Sec., 1128 Topeka Ave., Topeka, Kans.

Tennessee Veterinary Medical Association, January 18-19, 1943. A. C. Topmiller, Sec., 2620 Eighth Ave. S., Nashville, Tenn.

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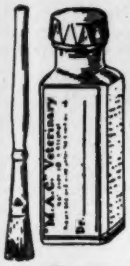

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Illinois State Veterinary Medical Association, January 21-22, 1943, Springfield, Ill. C. C. Hastings, Sec., Williamsville, Ill.

Mississippi State Veterinary Medical Association, January 21-22, 1943, State College. H. C. Simmons, Sec., Jackson, Miss.

Deaths of Veterinarians

T. L. Wright, 52, Moultrie, Ga., Alabama Polytechnic Institute '12. Served as Meat and Milk Inspector for Moultrie for a number of years. January 5.

Leondus K. Ogletree, 52, Greensboro, Ala., Alabama Polytechnic Institute '14. Practiced at Enterprise, Ala., before going to Greensboro. January 20.

John Lawrence Bogan, '42, Hamilton, N. Y., Cornell University. Practitioner at Old Forge before going to Hamilton. June 3.

Joseph M. Hafey, 55, Northampton, Mass., Ontario Veterinary College '10. Served in World War I in 13th Veterinary Hospital Unit. Had been City Meat Inspector for 15 years. June 17.

T. B. Gissendanner, Dothan, Ala., Alabama Polytechnic Institute '15. Also practiced at Monroe, Ga., for a number of years before going to Dothan. June 29.

George H. Oakes, 51, Moorhead, Minn., McKillip Veterinary College '16, was in the U. S. B. A. I. for the past 12 years. July 29.

J. W. Dunham, 77, Fargo, N. D., Ontario Veterinary College, '94, practiced in Fargo for 43 years. August 25.

D. M. Charlesworth, Roland, Ia., Grand Rapids Veterinary College '14. August 25.

Lloyd Woods Sloan, 53, Paris, Tenn., St. Joseph Veterinary College '20. Practitioner in Paris for about 18 years. September 29.

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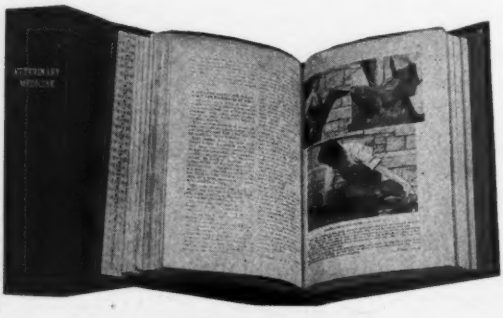

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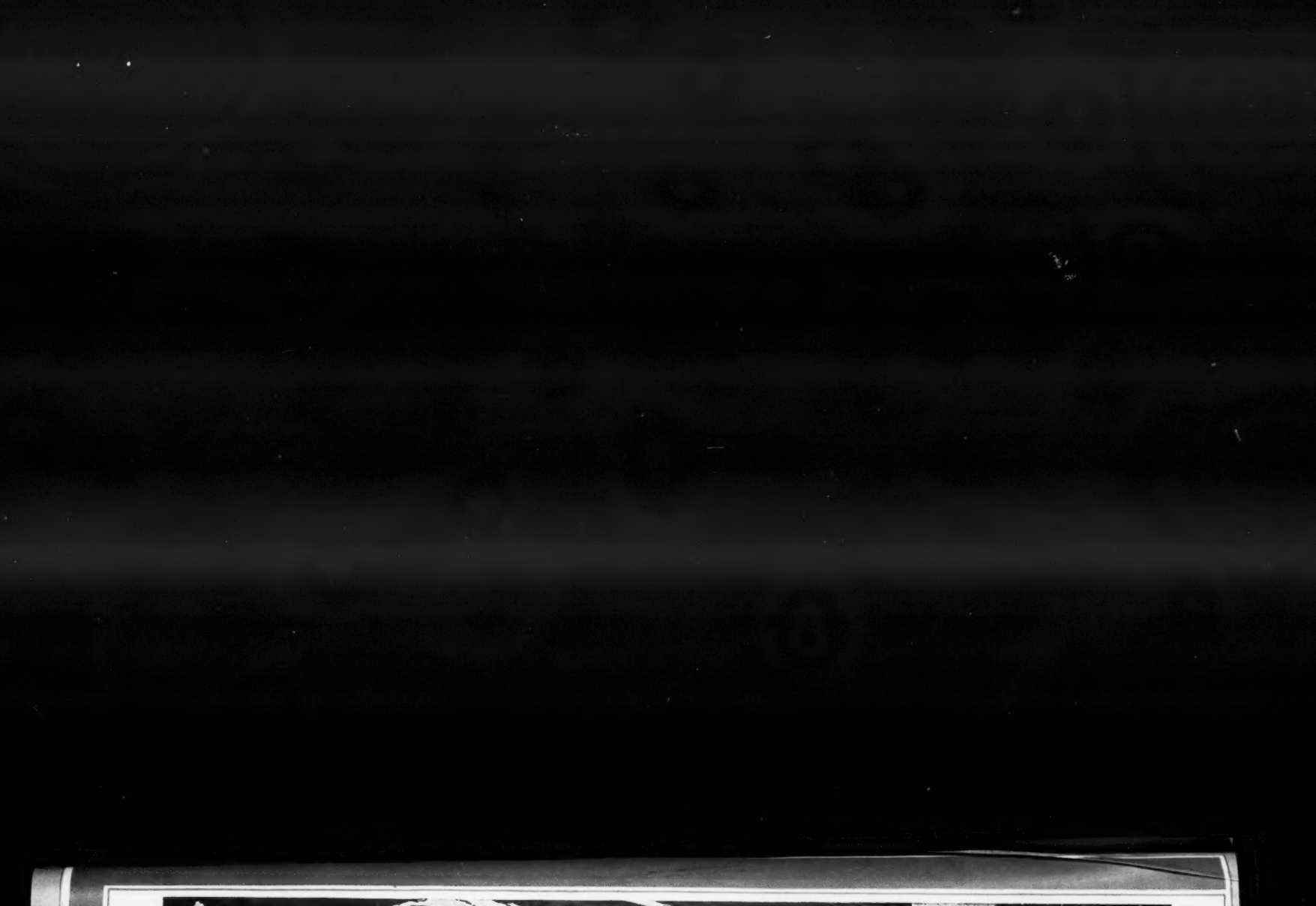
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